

DUKE
UNIVERSITY



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History

Duke University is built about a group of colleges which have their roots deep in the past. It was founded more than one hundred years ago when a number of earnest citizens from Randolph and adjacent counties assembled in a log school house to organize an educational society. They wished to provide lasting support for the local academy founded a few months before by an energetic son of North Carolina, Brantley York.

Moved by "no small share of philanthropy and patriotism," these men set forth their belief "that ignorance and error are the bane not only of religious but also of civil society" and that they "rear up almost an impregnable wall between man and the happiness he so ardently pants after." On that basis they formally adopted a constitution for the Union Institute Society. Thus in February, 1839, the academy became Union Institute. Twelve years later it was reorganized as Normal College expressly to train teachers. In order to expand its operations still further, the school was again reorganized in 1859 as Trinity College, a small liberal arts college. In 1892 it moved from the fields of Randolph County to the growing city of Durham. Thirty-two years later the College grew into Duke University. With increasing enrollment and the development of specialized needs, The Woman's College was formed in 1925 and the College of Engineering in 1938.

As the University developed around the core of the colleges, the Graduate School of Arts and Sciences expanded in number of students and in areas of instruction and research; the School of Law of Trinity College became the Duke University School of Law; and other professional schools were established. The Divinity School was organized in 1926, the School of Medicine and the School of Nursing in 1930, and the School of Forestry in 1938.

From academy to university the basic principles have remained constant. The University motto, *Eruditio et Religio*, reflects a fundamental faith in the union of knowledge and religion, the advancement of learning, the defense of scholarship, the love of freedom and truth, a spirit of

tolerance, and a rendering of the greatest service to the individual, the state, the nation, and the church. Through changing generations of students the objective has been to encourage each individual to achieve to the extent of his capacities an understanding and appreciation of the world in which he lives, his relationship to it, his opportunities, and his responsibilities.

Government

1. The Indenture of Trust by Which the University Was Created

Among the provisions of James B. Duke's Indenture of Trust was an educational institution to be known as Duke University, to the building and support of which he made provision at the time of execution of the Indenture and later by additions thereto by the operation of his Will. In respect to Duke University the Indenture contains the following provisions:

I. (In Article FOURTH) The Trustees hereunder are hereby authorized and directed to expend as soon as reasonably may be not exceeding Six Million Dollars of the corpus of this trust in establishing at a location to be selected by them within the State of North Carolina an institution of learning to be known as Duke University, for such purpose to acquire such land and erect and equip thereon such buildings according to such plans as the Trustees may in their judgment deem necessary and adopt and approve for the purpose to cause to be formed under the laws of such state as the Trustees may select for the purpose a corporation adequately empowered to own and operate such properties under the name of Duke University as an institution of learning according to the true intent hereof, and convey to such corporation when formed the said lands, buildings and equipment upon such terms and conditions as that such corporation may use the same only for such purposes of such universities and upon the same ceasing to be so used then the same shall forthwith revert and belong to the Trustees of this trust as and become a part of the corpus of this trust for all the purposes thereof.

However, should the name of Trinity College, located at Durham, North Carolina, a body politic and incorporate, within three months from the date hereof (or such further time as the Trustees hereof may allow) be changed to Duke University, then, in lieu of the foregoing provisions of this division "FOURTH" of the Indenture as a memorial to his father,

Washington Duke, who spent his life in Durham and whose gifts, together with those of Benjamin N. Duke, the brother of the party of the first part, and of other members of the Duke family, have so largely contributed toward making possible Trinity College at that place, he directs that the Trustees shall expend of the corpus of this trust as soon as reasonably may be a sum not exceeding Six Million Dollars in expanding and extending said University, acquiring and improving such lands, and erecting, removing, remodeling and equipping such buildings, according to such plans, as the Trustees may adopt and approve for such purpose to the end that said Duke University may eventually include Trinity College as its undergraduate department for men, a School of Religious Training, a School for Training Teachers, a School of Chemistry, a Law School, Co-ordinate College for Women, a School of Business Administration, a Graduate School of Arts and Sciences, a Medical School and an Engineering School, as and when funds are available.

II. (In Article FIFTH) Thirty-two per cent of said net amount not retained as aforesaid for addition to the corpus of this trust shall be paid to that Duke University for which expenditures of the corpus of the trust shall have been made by the Trustees under the "Fourth" division of this Indenture so long as its name shall be Duke University and it shall not be operated for private gain, to be utilized by its Board of Trustees, in defraying its administration and operating expenses, increasing and improving its facilities and equipment, the erection and enlargement of buildings and the acquisition of additional acreage for it, adding to its endowment or in such other manner for it as the Board of Trustees of said institution may from time to time deem to be of its best interests, provided that in case such institutions shall incur any expense of liability beyond provisions already in sight to meet same, or in the judgment of the Trustees under this Indenture be not operated in a manner calculated to achieve the results intended hereby the Trustees under this Indenture may withhold the whole or any part of such percentage from said institution so long as such character of expense or liabilities or operation shall continue, such amounts so withheld to be in whole or in part either accumulated and applied to the purposes of such University in any future year or years, or utilized for the other objects of this Indenture, or added to the corpus of this trust for the purpose of increasing the principal of the trust estate, as the Trustees may determine.

III. (In Article SEVENTH) I have selected Duke University as one of the principal objects of this trust because I recognize that education, when conducted along sane and practical, as opposed to dogmatic and theoretical, lines, is, next to religion, the greatest civilizing influence. I request that this institution secure for its officers, trustees, and faculty, men of such outstanding character, ability, and vision as will insure its attaining and maintaining a place of real leadership in the educational

world, and that great care and discrimination be exercised in admitting as students only those whose previous records show a character, determination, and application evincing a wholesome and real ambition for life. And I advise that the courses at this institution be arranged, first, with special reference to the training of preachers, teachers, lawyers and physicians, because these are most in the public eye, and by precept and example can do most to uplift mankind, and second, to instruction in chemistry, economics, and history, especially the lives of the great of earth, because I believe that such subjects will most help to develop our resources, increase our wisdom and promote human happiness.

IV. (In Article THIRD) as respects any year or years and any purpose or purposes for which this trust is created (except the payments hereinafter directed to be made to Duke University) the Trustees in their uncontrolled discretion may withhold the whole or any part of said incomes, revenues and profits which would otherwise be distributed under the "Fifth" division hereof, and either (1) accumulate the whole or any part of the amount so withheld for expenditures (which the Trustees are hereby authorized to make thereof) for the same purpose in any future year or years, or (2) add the whole or any part of the amounts so withheld to the corpus or the trust, or (3) pay, apply and distribute the whole or any part of said amounts to and for the benefit of any one or more of the other purposes of this trust, or (4) pay, apply and distribute the whole or any part of said amounts to or for the benefit of any such like charitable, religious or educational purpose within the State of North Carolina or the State of South Carolina, or any such like charitable hospital purpose which shall be selected therefor by Trustees called for the purpose, complete authority and discretion in and for such selection and utilization being hereby given the Trustees in the premises.

2. The Charter of the University

Section 1. That A. P. Tyer, J. H. Southgate, B. N. Duke, G. A. Oglesby, V. Ballard, J. A. Long, J. F. Burton, J. N. Cole, F. A. Bishop, J. G. Brown, C. W. Toms, J. W. Alspaugh, W. R. Odell, J. A. Gray, F. Stikeleather, Kope Elias, S. B. Turrentine, P. H. Hanes, T. F. Marr, G. W. Flowers, M. A. Smith, R. H. Parker, W. J. Montgomery, F. M. Simmons, O. W. Carr, R. A. Mayer, N. M. Journey, Dred Peacock, B. B. Nicholson, W. G. Bradsher, E. T. White, T. N. Ivey, J. B. Hurley, R. L. Durham, W. C. Wilson, and their associates and successors shall be, and continue as they have been, a body politic and corporate under the name and style of DUKE UNIVERSITY, and under such name and style shall have perpetual existence and are hereby invested with all the property and rights of property which now belong to the said corporation, and said corporation shall henceforth and perpetually, by the name and style of

DUKE UNIVERSITY, hold and use all the authority, privileges, and possessions it had or exercised under any former title and name, and be subject to all recognized legal liabilities and obligations now outstanding against such corporations.

Section 2. That such corporation is authorized to receive and hold by gift, device, purchase or otherwise, property, real and personal, to be held for the use of said University and its dependent schools or for the use of either or both (as may be designated in the conveyance or will).

Section 3. That the Trustees shall be thirty-six in number of whom twelve shall be elected by the North Carolina Conference of the M. E. Church, South; twelve by the W. N. C. Conference of the said church; and twelve by the graduates of said University; *Provided*, however, That no person shall be elected a Trustee till he has first been recommended by a majority of the Trustees present at a regular meeting; and the Trustees shall have power to remove any member of their body who may remove beyond the boundary of the State or who may refuse or neglect to discharge the duties of a Trustee. The term of office of Trustees shall be six years, and they shall be so arranged that four Trustees shall be elected by each Conference and four by the graduates every two years. The Trustees shall regulate by bylaws the manner of election of Trustees to be chosen by the graduates. Should there exist a vacancy by death, resignation, or otherwise of any Trustee, the same shall be filled for the unexpired term by the Board of Trustees. That the present Trustees shall continue and remain in office during the term for which they have been heretofore respectively elected.

Section 4. That the said corporation shall be under the supervision, management and government of a president and such other persons as said Trustees may appoint; the said president, with the advice of other persons so appointed, shall from time to time make all needful rules and regulations for the internal government of said University and prescribe the preliminary examinations and terms and conditions on which pupils shall be received and instructed.

Section 5. That said Trustees shall have power to make such rules, regulations, bylaws not inconsistent with the Constitution of the United States and of this State, as may be necessary for the good government of said University and management of the property and funds of the same.

Section 6. That the Trustees shall have power to fix the time of holding their annual and other meetings, to elect a president and professors for said University, to appoint an executive committee to consist of not less than seven members, which committee shall control the internal regulations of said University and fix all salaries and emoluments, and to do all other things necessary for an institution of learning not inconsistent with the laws of this State and of the United States.

Section 7. That the Faculty and Trustees shall have the power of

conferring such degrees and marks of honor as are conferred by colleges and universities generally; and that five Trustees shall be a quorum to transact business.

Section 8. That all laws and parts of laws or of the charter heretofore granted which are in conflict with this act are hereby repealed.

Section 9. That this act shall be in force from and after its ratification and acceptance by the Board of Trustees.

3. The Bylaws of the University

Article I. Aims

1. The aims of Duke University are to assert a faith in the eternal union of knowledge and religion set forth in the teachings and character of Jesus Christ, the Son of God; to advance learning in all lines of truth; to defend scholarship against all false notions and ideals; to develop a Christian love of freedom and truth; to promote a sincere spirit of tolerance; to discourage all partisan and sectarian strife; and to render the largest permanent service to the individual, the state, the nation, and the church. Unto these ends shall the affairs of this University always be administered.

Article II. Board of Trustees

1. **Powers.** All powers of the University shall be vested in a Board of Trustees consisting of thirty-six members.

2. **Nomination and Elections.** The Trustees shall be elected as follows, twelve by the North Carolina Conference of the Methodist Church; twelve by the Western North Carolina Conference of the Methodist Church; and twelve by the graduates of Duke University.

The Executive Committee, acting as a committee on nominations, shall report to the Board the names of the persons whom it nominates for election as Trustees. The Board, by majority vote of the Trustees present at a regular meeting, shall recommend the persons to be elected Trustees and submit its recommendations to the appropriate Conference of the Methodist Church and the graduates.

No person who shall have attained the age of seventy years shall be elected a Trustee.

3. **Term.** The term of office of a Trustee shall be six years, beginning on the first day of January following the election, and the terms shall be so arranged that four Trustees shall be elected by each Conference and four by the graduates every two years.

4. **Vacancies.** Any vacancy in the membership of the Board of Trustees

shall be filled for the unexpired term by a majority vote of the Trustees present at a regular meeting of the Board.

5. Retirement. A Trustee who attains or has attained the age of seventy years shall retire at the end of the term for which he has been elected.

6. Emeritus. The Board of Trustees may elect a retiring or resigning Trustee a Trustee Emeritus. Trustees Emeriti shall be entitled to receive notice of all meetings of the Board and attend and participate in such meetings, but shall not have the right to vote.

7. Removal. Any Trustee who may refuse or neglect to discharge the duties of Trustee may be removed by the affirmative vote of three-fourths of the members of the entire Board of Trustees.

Article III. Meetings of the Board

1. Annual Meeting. The annual meeting of the Board of Trustees shall be held on the Saturday before the first Monday in June.

2. Regular Meetings. Regular meetings of the Board of Trustees shall be held on the Saturday preceding the day on which Founders' Day is celebrated and on the first Friday in March.

3. Special Meetings. Special meetings shall be held upon the call of the Chairman, or upon written request of twelve or more Trustees addressed to the Secretary, with a copy to the Chairman specifying the business to be transacted at the meeting.

4. Notice. The Secretary shall give at least five days' notice to each member of the Board stating the time and place of all meetings, and the purpose of any special meeting.

5. Place. All meetings of the Board of Trustees shall be held at Duke University in the City of Durham, North Carolina, except that the Trustees by vote, or written assent, of a majority of the then members of the Board may designate another place for any meeting.

6. Quorum. A majority of the then members of the Board of Trustees shall be a quorum for the transaction of business.

Article IV. Officers of the Board

1. Officers of the Board. The officers of the Board of Trustees shall be a Chairman, a Vice Chairman, and a Secretary.

2. Election. The officers of the Board of Trustees shall be elected at its annual meeting for a term of one year or until their successors are elected and qualified.

3. Duties.

a. The Chairman shall preside at all meetings of the Board, shall represent the Trustees at public meetings of the University, and shall be a member of and Chairman of the Executive Committee.

b. The Vice Chairman shall perform the duties of the Chairman in

the absence or disability of the Chairman, or in the event of a vacancy in that office.

- c. The Secretary of the University shall also be the Secretary of the Board of Trustees. He shall record the minutes of all meetings of the Board and its Executive Committee, and shall have custody of the Charter, Bylaws, minutes, records and other documents of the Board and its Committees. The Secretary shall send a copy of the minutes to each member of the Board promptly after each meeting of the Board and of the Executive Committee.

4. *Vacancies.* A vacancy in any office of the Board of Trustees may be filled for the unexpired term by the Board of Trustees.

Article V. Committees of the Board

1. *Committees.* The Standing Committees of the Board shall be:

1. Executive Committee
2. Building and Grounds Committee
3. Committee for Institutional Advancement
4. University Committee.

The Board of Trustees may authorize other committees from time to time.

The Committees of the Board of Trustees shall have the powers and duties set forth in these Bylaws and such other powers and duties as the Board may delegate to them. They shall exercise their powers and perform their duties subject to the direction and approval of the Board. They may from time to time make recommendations to the Board for the establishment of new policies or any changes in existing policies.

2. *Membership.* At each annual meeting the Board of Trustees shall elect the members of the four Standing Committees to serve for the ensuing year. The Chairman of the Board of Trustees and the President of the University shall be members of the Executive Committee and shall be ex officio, non-voting members of all other Committees of the Board of Trustees.

Insofar as practical membership on the Standing Committees should be rotated.

3. *Vacancies.* Any vacancy in the membership of a Standing Committee shall be filled by the Chairman of the Board of Trustees.

4. *Meetings.* Each Standing Committee shall meet at such times and places and upon such notice as it may determine, and shall file a copy of the minutes of each meeting with the Secretary of the University.

5. *Quorum.* A majority of the then members of a Standing Committee shall be a quorum for the transaction of business.

Article VI. Executive Committee

1. Membership. The Chairman of the Board, the President of the University, and not less than five Trustees shall constitute the Executive Committee of this Board.*

2. Powers and Duties. The Executive Committee shall:

- a. Control the internal regulations of the University.
- b. Fix all salaries, emoluments, and other allowances.
- c. Approve annual budget and authorize the annual audit.
- d. Appoint an Investment Committee of not less than five members, at least two of whom shall be Trustees, with such powers and duties as may be assigned to it by the Executive Committee.
- e. Subject to the provisions of the Charter and these Bylaws, exercise all powers of the Board of Trustees in the interims between meetings of the Board.
- f. Report its actions to the Board of Trustees.
- g. Act as the Nominating Committee for the election of Trustees.
- h. Appoint a Budget and Audit Committee, composed of not less than three (3) members, at least two (2) of whom shall be Trustees, and the Vice President for Business and Finance, ex officio, with such powers and duties as may be assigned to it by the Executive Committee.

Article VII. Building and Grounds Committee

1. Membership. The Building and Grounds Committee shall be composed of not less than five Trustees and the Vice President for Business and Finance ex officio.

2. Powers and Duties. The Building and Grounds Committee shall consider proposals by the President for:

- a. Plans for the development and use of the University's buildings, grounds, and utilities devoted to educational purposes.
- b. The kind, location and plans for all buildings, utilities and improvements, including roads and parking areas.
- c. Architects and contractors.

The Committee shall have authority to accept all new construction on behalf of the University but shall not incur any expenses not previously authorized by the Board of Trustees or the Executive Committee.

The Committee shall report its findings and recommendations to the Board of Trustees or the Executive Committee.

Article VIII. Committee for Institutional Advancement

1. Membership. The Committee for Institutional Advancement shall

*The Chancellor, the Provost, and the Vice President for Business and Finance have been made interim members until a new President of the University is elected.

be composed of not less than five Trustees and the Vice President for Institutional Advancement ex officio.

2. Powers and Duties. The Committee for Institutional Advancement shall consider proposals by the President for policies and plans concerning the financial development, fund raising, public relations, and alumni affairs of the University.

The Committee shall report its findings and recommendations to the Board of Trustees or the Executive Committee.

Article IX. University Committee

1. Membership. The University Committee shall be composed of not less than twelve Trustees and the Provost ex officio.

2. Powers and Duties. The University Committee shall:

- a. Serve as a Board of Visitors to the University.
- b. Serve as a Committee on Earned Degrees.
- c. Consider proposals by the President for the educational role of each school, college, and unit of the University and for the University as a whole, the admission of students at all levels, student life and activities, educational and research programs, and the coordination of all educational activities.
- d. Designate five trustees who, along with an equal number of faculty members designated by the President, and the President ex officio, shall serve as a Committee on Honorary Degrees to make recommendations to the University Faculty and the Board of Trustees.

The Committee shall report its findings and recommendations to the Board of Trustees or the Executive Committee.

Article X. Officers of the University

1. The Officers of the University shall be a President, a Chancellor, a Provost, a Vice President for Business and Finance, a Vice President for Institutional Advancement, one or more other Vice Presidents, a Treasurer, a Secretary, a University Counsel, and such other officers as the Board of Trustees may elect. One person may hold more than one office, except that the offices of President and Secretary may not be held by the same person.

2. These Officers shall be elected by the Board of Trustees at its annual meeting for a term of one year and shall serve until their successors are elected and have taken office.

3. A vacancy in any office of the University may be filled, for the unexpired term, by the Board of Trustees or by the Executive Committee.

Article XI. President

1. The President shall be the chief educational and administrative officer of the University. He shall be responsible to the Board of Trustees for the supervision, management, and government of the University, and for interpreting and carrying out the policies of the Board of Trustees. He shall have the powers and duties set forth in the Charter and in these Bylaws, and such other powers and duties as the Board of Trustees shall delegate to him.

2. He, or someone designated by him, shall preside at all academic functions and represent the University before the public.

3. He shall preside at all meetings of the University Faculty. He may veto any action taken by the University Faculty or any action taken by the faculty of any college or school in the University and state his reasons for such action.

4. He shall submit a proposed annual budget for the University to the Executive Committee prior to the beginning of the fiscal year covered by the budget.

5. He shall submit to the Board of Trustees an annual report on the condition, operations and needs of the University.

6. He shall recommend to the Board of Trustees persons to be officers of the University other than the President.

Article XII. Provost

1. The Provost shall be an executive officer of the University, under the President, responsible for all educational affairs and activities, including research, and for all aspects of student activity and welfare. He shall have the powers and duties assigned to him by the President and shall report to the President.

2. He shall be a member of the faculty of each college and school, and ex officio a member of each committee (other than Committees of the Board of Trustees) or other body concerned with matters for which he is responsible.

3. He shall receive recommendations developed by the faculty and educational officers for consideration and recommendation to the President.

4. He shall assume the powers and duties of the President during the incapacity or absence of the President or in case of a vacancy in that office.

Article XIII. Vice President for Business and Finance

1. The Vice President for Business and Finance shall be an executive officer, under the President, responsible for all business and finance, in-

cluding accounting and auditing, preparation of budgets, fiscal planning, and operating of services of the University. He shall have the power and duties assigned to him by the President and shall report to the President.

2. He shall have custody of all records, contracts, agreements, deeds, and other documents of the University or relating to its operations or properties, except minutes of meetings.

3. He shall submit to each regular meeting of the Executive Committee a report on those aspects of the finances of the University that the Executive Committee may require, and shall submit to the Board of Trustees at the end of each fiscal year an account of all receipts and disbursements for the preceding year and a statement in such detail as the Board of Trustees may require of the financial condition of the University at the end of such year.

4. He and the personnel under him shall be bonded to the extent determined by the Executive Committee.

Article XIV. Vice President for Institutional Advancement

The Vice President for Institutional Advancement shall be an executive officer, under the President, responsible for all public and alumni relations, fund raising, and long range planning and development. He shall have the powers and duties assigned to him by the President and shall report to the President.

Article XV. Treasurer

1. The Treasurer shall report to the President or such officer of the University as the President may direct and shall have the powers and duties assigned to him by the President or such other officer.

2. He may receive and disburse investment funds and purchase, sell, or otherwise dispose of investment securities pursuant to the directions of the Executive Committee or Investment Committee, as the case may be.

3. He and the personnel under him shall be bonded to the extent determined by the Executive Committee.

Article XVI. Secretary

1. The Secretary, under the President, shall have all of the powers and duties set forth in these Bylaws and the powers and duties commonly incident to his office. He also shall have the powers and duties assigned to him by the President and shall report to the President.

2. He shall be the custodian of the seal of the corporation and shall affix and attest to same on all duly authorized contracts, deeds, and other documents.

3. He shall maintain an official roster setting forth the status of all persons employed by the University.

Article XVII. University Counsel

The University Counsel shall be the legal advisor to the University and shall be responsible for all matters of a legal nature concerning the University, including litigation, preparation or approval of all contracts, deeds, conveyances, or other documents.

Article XVIII. Faculty

1. The University Faculty shall be composed of the President, the Provost, the Vice Presidents, the Secretary (who shall also be the Secretary of the Faculty), all deans, professors, associate professors, and assistant professors, Registrar, and the University Librarian, and such other persons as may be designated by the President and approved by the Executive Committee or the Board of Trustees.

2. The University Faculty shall be responsible for the conduct of instruction and research in the various colleges and schools in the University. It may also consider and make recommendations to the President regarding any and all phases of education at the University.

3. The University Faculty shall approve and recommend to the Board of Trustees the persons it deems fit to receive degrees or other marks of distinction, and the establishment of any new degree or diploma.

4. The University Faculty may organize and exercise its functions through appropriate councils, committees, or other bodies.

5. Each college and school in the University may have a faculty of its own, which shall be composed of the President, the Provost, the Secretary, and all members of the University Faculty in the particular college or school. Each such faculty shall function under the President and other officers of educational administration and subject to the regulations of the University Faculty.

Article XIX. Appointments, Promotions and Tenure

1. Members of the University Faculty shall be elected, appointed, or promoted by the Board of Trustees or the Executive Committee upon the recommendation of the Provost, with the approval of the President.

2. Members of the University Faculty, above the rank of instructors, shall have tenure after seven years of continuous service at the University, or such shorter period as may be determined for individual cases, by the Board of Trustees or the Executive Committee; provided that any such person shall be subject to dismissal by the Board of Trustees or the Executive Committee for misconduct or neglect of duty.

Article XX. Sabbatical Leaves

1. Each member of the University Faculty of the rank of professor, associate professor, or assistant professor shall be eligible for sabbatical leave after each six years of service to the University. Such leave may be taken for a full year at half salary or a half year at full salary.

2. Sabbatical leave may be granted by the Executive Committee upon the written recommendation of the dean of the appropriate college or school, approved by the Provost and the President.

Article XXI. Retirement

1. All members of the faculty of the University who are eligible for or participate in the TIAA Plan and who would attain the age of seventy years prior to March 1 of a given academic year shall retire at the end of the preceding academic year and all such members of the faculty who attain the age of seventy years on or after March 1 in a given academic year shall retire at the end of such academic year.

2. The retirement and annuity plan adopted by the University on October 1, 1925, is hereby amended in those respects required to conform with the provisions of the Bylaws.

Article XXII. Fiscal Year, Academic Year and Academic Calendar

1. The fiscal year of the University shall commence on July 1 and end on the following June 30.

2. The academic year of the University shall commence on September 1 and end on the following August 31.

3. The President shall establish the academic calendar for each academic year, except that graduation exercises shall take place on the first Monday in June of each year.

Article XXIII. Amendment of Bylaws

These Bylaws may be amended at any regular meeting of the Board of Trustees by the affirmative vote of two-thirds of the then membership of the Board, provided that the proposed amendment is mailed by the secretary of the Board to each member at least twenty days before the meeting.



ALUMNI ORGANIZATIONS

All qualified former students of Duke University are enrolled as members of the General Alumni Association, which meets on the campus each June. The Association elects its officers and alumni representatives to the Athletic Council each spring by mail ballot. Graduate alumni also elect four representatives to the University Board of Trustees in alternate years by mail ballot.

In addition to the General Alumni Association, there are individual sub-associations for seven of the University's ten schools and colleges. These include, at the undergraduate level, The Woman's College, the School of Nursing, and the School of Engineering, and at the graduate and professional level, the Schools of Medicine, Forestry, Law, and Divinity.

Each class that has been graduated from the University also exists as a permanent organization, and its members reunite at intervals of approximately five years. In some 100 locations, where Duke alumni live in concentrated numbers, there are local alumni associations with purposes compatible to those of the General Alumni Association.

The executive body of the organized alumni is the Duke University National Council. Its membership includes representatives from each alumni organization as well as from each University faculty and from the various student bodies. The National Council meets twice each year, at Founders' Day in December and during Alumni Week End in June.

The Department of Alumni Affairs exists as the University's administrative and coordinating agency for the broad spectrum of alumni programs. The Loyalty Fund program of annual giving and the Bequest Program,



conducted under the auspices of the National Council, are also administered by the Department of Alumni Affairs.

The broad purpose of the Duke University alumni organization can best be indicated by quoting Article II of the constitution of the General Alumni Association: "The objects of this Association shall be to unite its members in good fellowship and in cooperative enterprise with the faculties, students, officers, and trustees of Duke University, toward the fulfillment of the University's educational and humanitarian purposes; to aid in providing for the University an atmosphere in which scholarship and learning might flourish and in which the continuing search for truth and enlightenment might proceed unhindered; and in all appropriate ways to assist and stimulate Duke University toward significant achievement and influence."



Gifts and Bequests

Duke University is a privately established institution which derives its principal support from endowment funds and from gifts and grants, thus enabling it to offer both academic and professional training to its students at a fraction of the actual cost. Gifts and grants for both operational and capital development purposes presently account for approximately one-half of the University's annual income. They are essential to the quality of its educational services and to its progress as a center of learning and research.

Gifts to Duke University, of course, fully qualify as tax deductible contributions.

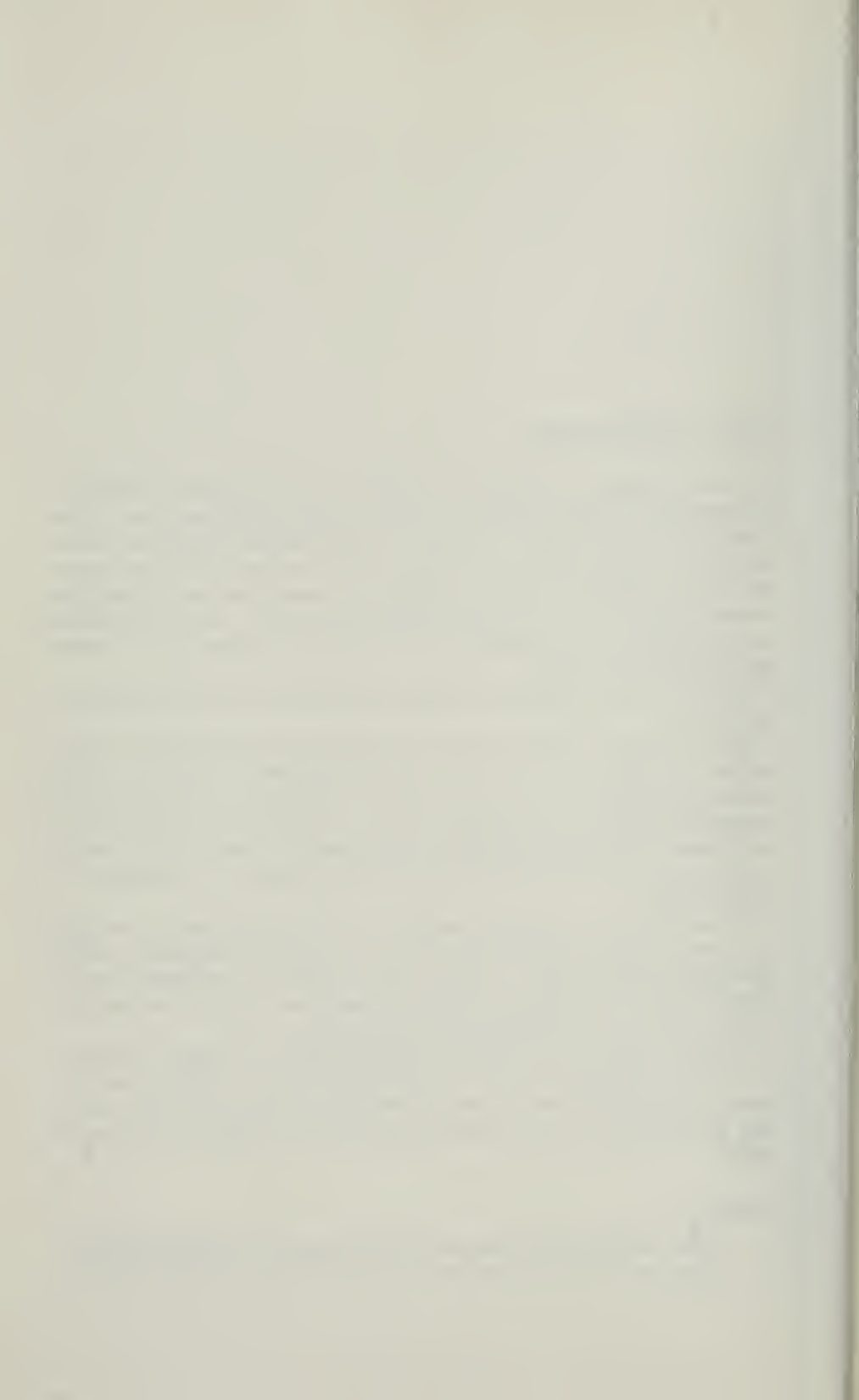
The University welcomes gifts, immediate or deferred, when made without restriction as to use or when designated for any of a broad variety of purposes. Gifts may be of cash, securities, or any kind of real or personal property, depending upon the wishes and the conveniences of the donor, and University officers are prepared to confer at any time to make sure that both the donor's wishes and possible tax advantages are fully realized.

A number of publications, designed to assist the donor in making a gift, are available, and requests for these or other information will be promptly acknowledged. Such requests should be addressed to the Office of the Vice President for Business and Finance, 211 Allen Building, Duke University, Duke Station, Durham, N.C.

Deferred gifts may be made through bequests or through insurance, as well as through a variety of trust arrangements. Such gifts may become significant factors in estate planning, and while qualified counseling is essential in most instances, some sample bequest forms may be noted:

General

I give (devise; if real property) and bequeath to Duke University, a corporation existing under the laws of the State of North Carolina



and located in the City and County of Durham, State of North Carolina, and its successors forever, the sum of dollars (or otherwise describe the gift) for the general purposes and uses of the University at the discretion of the Board of Trustees.

Specific

I give (devise; if real property) and bequeath to Duke University, a corporation existing under the laws of the State of North Carolina and located in the City and County of Durham, State of North Carolina, or its successors forever, the sum of dollars (or otherwise describe the gift) and direct that the income therefrom shall be used for the following purposes, viz. (here describe the use desired).

Codicil

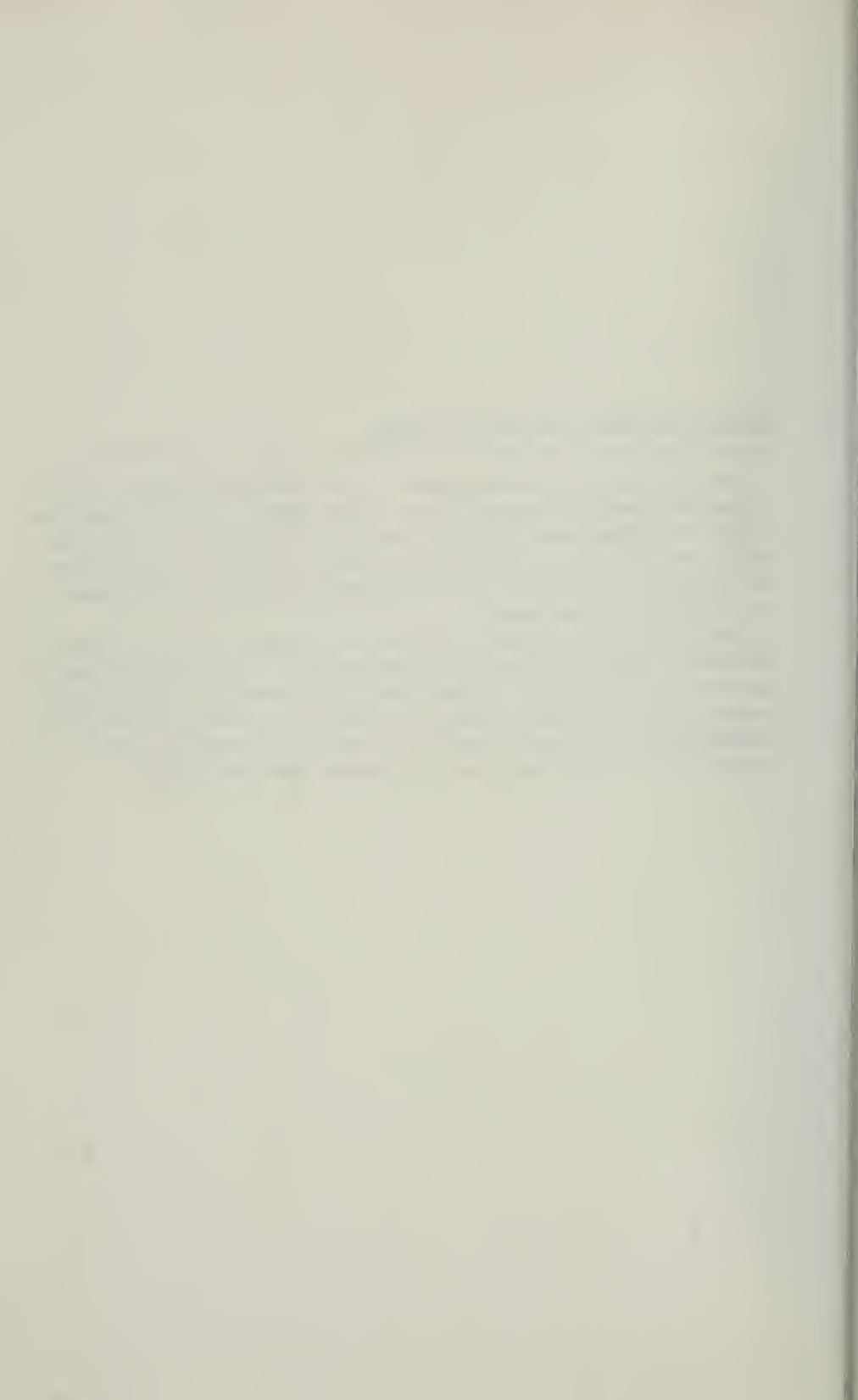
Having hereinbefore made my last Will and Testament dated, and being of sound mind, I hereby make, publish, and declare the following codicil thereto; (here insert clause in same form as if it had been included in body of Will). Except as hereinbefore changed, I hereby ratify, confirm, and republish my said last Will and Testament.



Office of Information Services

The Office of Information Services is the official news agency of the University, and all University news, except sports, emanates from this office. The Office maintains the University's relationship with the press, radio and television, and other communications media, and interprets the University—its faculty, its research, and its academic achievements—to the public via these media.

The Office also maintains individual biographical files on all faculty members, students, and staff, as well as files on all University departments and activities. Its files of clippings form a rich source of historical information of the Institution's life. In addition, the Office is a source of information for the many inquiries about Duke University which are received daily from all sections of the nation and from abroad.



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Financial Report



1968-69

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BULLETIN
OF
DUKE UNIVERSITY
FINANCIAL REPORT

Year Ended June 30, 1969



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LETTER OF TRANSMITTAL

To the Board of Trustees of Duke University:

We submit for your examination and information the annual financial report of Duke University which shows in some detail the results of the operation for the year ended June 30, 1969.

The figures contained in this report have been verified by our certified public accountants, Peat, Marwick, Mitchell & Co., and the Balance Sheet, the Statement of Current Revenues, Expenditures and Appropriations, the Statements of Changes in Fund Balances, the Statement of Changes in Net Investment in Plant, as well as the several schedules of gifts and grants, have been taken directly from their audit report.

The Balance Sheet includes only those assets to which title actually vests in Duke University and consequently does not include any portion of the indivisible corpus of The Duke Endowment, the income from which, subject to the terms of the Trust Indenture, accrues to Duke University as one of the several beneficiaries. Nor do the accounts include the principal funds of trusts independently administered for the benefit of Duke University; such as, The Frederic M. Hanes Bequest, The Frederic M. Hanes Memorial Trust, the Albert Anderson Bequest, the James A. Gray Foundation, the Mary Alyse Smith Scholarship Fund, and the Durham Foundation: Alyse Smith Cooper Fund.

The Endowment Funds of the University are invested in securities in accordance with an investment policy established by the Investment Committee of the Board of Trustees. A list of securities held at June 30, 1969, is included in this report. A summary, showing both cost and market values, of investments held by the various fund groups at June 30, 1969 is included in the Notes to Financial Statements.

It will appear from the Statement of Current Revenues, Expenditures, and Transfers that the University, exclusive of the hospitals, closed the year with a net loss from operations of \$568,917. Duke Hospital operations generated a surplus of \$973,648 and Highland Hospital operated at a loss of \$84,801, making the excess of revenues over expenditures and transfers for Duke University as a whole amount to \$319,930.

The following summary and comparison of Educational and General Revenues and Expenditures will be of interest.

<i>Revenues</i>	1969		1968	
	<i>Amount</i>	<i>Percent of total</i>	<i>Amount</i>	<i>Percent of total</i>
Educational and general:				
Endowment income:				
Duke Endowment	\$ 6,143,302	7%	\$ 5,308,785	7%
Funds held by University	2,846,431	3	2,762,775	3
	8,989,733	10	8,071,560	10
Loyalty funds	605,906	1	600,865	1
Gifts and grants:				
Research programs	16,289,915	18	15,103,388	19
Training programs	5,376,378	6	6,159,245	8
Special programs	2,871,201	3	3,232,228	4
Libraries	170,563	—	36,880	—
Instruction and departmental research	1,017,767	1	104,250	—
Student services	9,600	—	—	—
Current expenses	2,027,727	2	536,382	1
	27,763,151	30	25,172,373	32
Tuition and fees	11,306,189	12	10,043,227	13
Investment income	456,961	1	580,333	1
Organized activities relating to educational departments	99,544	—	—	—
Sales and services of educational departments	1,359,595	1	1,717,271	2
Received from medical and surgical private diagnostic clinics	3,231,079	4	1,874,766	2
Indirect expense recovery on sponsored research and training activities and contract services	3,468,812	4	2,927,432	4
	57,280,970	63	50,987,827	65

Related activities:				
Duke Hospital	21,591,512	23	16,071,044	21
Highland Hospital	1,533,203	2	1,272,635	2
Other	—	—	23,412	—
	<u>23,124,715</u>	<u>25</u>	<u>17,367,091</u>	<u>23</u>
Student aid:				
Gifts for fellowships and scholarships	1,250,087	2	1,961,339	3
Designated scholarships	334,097	—	260,443	—
Endowment income	322,963	—	313,340	—
Investment income	4,791	—	3,479	—
	<u>1,911,938</u>	<u>2</u>	<u>2,538,601</u>	<u>3</u>
Auxiliary enterprises	7,703,345	9	6,211,439	8
	<u>90,020,968</u>	<u>99</u>	<u>77,104,958</u>	<u>99</u>
Add excess restricted funds expenditures and transfers over revenues received during year				
	1,111,270	1	526,065	1
	<u>\$ 91,132,238</u>	<u>100%</u>	<u>\$ 77,631,023</u>	<u>100%</u>
<i>Expenditures and Transfers</i>				
Educational and general:				
Instruction and departmental research	\$ 14,527,720	16%	\$ 12,638,863	16%
Organized activities relating to educational departments	507,280 (A)	—	—	—
Research programs	17,992,832	20	16,951,814	22
Training programs	6,385,557	7	6,933,529	9
Special programs	3,569,844	4	2,996,484	4
Libraries	2,349,570	3	2,086,554	3
Student services	1,766,347 (B)	2	861,831	1
Operation and maintenance of physical plant	3,537,722	4	2,477,118	3
General administration	3,508,843	4	3,268,760	4
	<u>54,145,715</u>	<u>60</u>	<u>48,214,953</u>	<u>62</u>
Related activities:				
Duke Hospital	20,617,864	23	16,526,396	21
Highland Hospital	1,618,004	2	1,214,535	2
Other	—	—	303,593	—
	<u>22,235,868</u>	<u>25</u>	<u>18,044,524</u>	<u>23</u>
Student aid:				
Fellowships and scholarships	4,051,412	4	3,957,128	5
Other	92,525	—	486,840	1
	<u>4,143,937</u>	<u>4</u>	<u>4,443,968</u>	<u>6</u>
Auxiliary enterprises	8,073,021	9	5,440,429	7
	<u>88,598,541</u>	<u>98</u>	<u>76,143,874</u>	<u>98</u>
Add (deduct) transfers:				
Student loan funds	15,005	—	16,812	—
Endowment funds—net	(10,686)	—	39,300	—
Plant funds—net	2,209,448	2	1,930,988	2
	<u>\$ 90,812,308</u>	<u>100%</u>	<u>\$ 78,130,974</u>	<u>100%</u>

(A) Included as part of instructional and departmental research in 1968.

(B) Includes expenses of offices of deans, admissions, financial aid and registrar of approximately \$840,000. Such expenditures were included in instructional and departmental research and general administration expenditures in 1968.

During the year the University changed its accounting policies and procedures in accordance with the revised edition of "College and University Business Administration" (American Council of Education). The results of these changes are explained in item 7 of the Notes to Financial Statements.

Respectfully submitted,
 CHARLES B. HUESTIS
*Vice President for
 Business and Finance*
 S. C. HARWARD
Controller

REPORT OF INDEPENDENT CERTIFIED PUBLIC ACCOUNTANTS

Board of Trustees

Duke University

We have examined the balance sheet of Duke University as of June 30, 1969, the related statement of current revenues, expenditures, and transfers, and the statements of changes in fund balances for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying balance sheet, the statement of current revenues, expenditures, and transfers, and the statements of changes in fund balances present fairly the financial position of Duke University at June 30, 1969 and the results of its operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year except for the changes (which we approve) described in note 7 of the notes to the financial statements.

PEAT, MARWICK, MITCHELL & CO.

Greensboro, N. C.

September 26, 1969

DUKE UNIVERSITY
BALANCE SHEET
As of June 30, 1969
ASSETS

CURRENT FUNDS:

Unrestricted:

Pooled cash and securities:

Cash

\$ 2,126,335

Marketable securities, at cost or amortized
value (note 3)2,224,760

4,351,095

Less equity of other funds

4,098,393

252,702

Notes and accounts receivable:

Hospital accounts receivable

\$ 8,926,524

Less allowance for doubtful accounts (note 7)

3,883,531

5,042,993

Other accounts and notes receivable

1,341,665

6,384,658

Investments, at cost or amortized value
(note 3)

309,923

Inventories, at cost (note 7)

1,859,067

Deferred charges (note 7)

448,062

Total current unrestricted funds

9,254,412

Restricted:

Equity in pooled cash and securities

1,448,008

Notes and accounts receivable

52,874

Investments, at cost or amortized value
(note 3)5,113,421

Total current restricted funds

6,614,303

Total current funds

15,868,715

STUDENT LOAN FUNDS:

Equity in pooled cash and securities

527,960

Notes receivable

3,780,342

Investments, at cost or amortized value (note 3)

113,232

Total student loan funds

4,421,534

ENDOWMENT AND SIMILAR FUNDS:

Equity in pooled cash and securities

524,206

Due from unexpended plant funds (note 2-b)

712,500

Investments, at cost or amortized value (note 3)

67,631,986

Total endowment and similar funds

68,868,692

PLANT FUNDS:

Unexpended plant funds:

Equity in pooled cash and securities

1,814,362

Notes and accounts receivable

309,382

Investments, at cost or amortized value (note 3)

3,766,508

Total unexpended plant funds

5,890,252

Invested in plant (note 2):

Land, buildings, equipment, library books, etc.

163,103,497

Total invested in plant

163,103,497

Total plant funds

168,993,749

AGENCY FUNDS:

Student loan notes receivable

466,697

Other accounts and notes receivable

2,922

Investments, at cost (note 3)

240,278

Inventories (\$19,048) and other assets

34,413

Total agency funds

744,310

\$258,897,000

See accompanying notes to financial statements.

BALANCE SHEET

As of June 30, 1969

LIABILITIES AND FUND BALANCES

CURRENT FUNDS:

Unrestricted:

Accounts payable and encumbrances	\$ 3,977,658
Students' deposits	298,962
Deferred income	572,097
Liability for post retirement benefits	174,000
Fund balance—unappropriated (note 7)	<u>4,231,695</u>
Total current unrestricted funds	9,254,412

Restricted:

Purchase orders and other encumbrances	\$ 4,498,382
Fund balances—net (note 7)	<u>2,115,921</u>

Total current restricted funds	<u>6,614,303</u>
--------------------------------	------------------

Total current funds	<u>15,868,715</u>
---------------------	-------------------

STUDENT LOAN FUNDS:

Fund balances	<u>4,421,534</u>
---------------	------------------

Total student loan funds	4,421,534
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ENDOWMENT AND SIMILAR FUNDS (note 1):

Fund balances	<u>68,868,692</u>
---------------	-------------------

Total endowment and similar funds	68,868,692
-----------------------------------	------------

PLANT FUNDS:

Unexpended plant funds:

Due to endowment and similar funds (note 2-b)	712,500
Fund balances (including outstanding purchase orders of \$1,512,318)—net (notes 2-c and 7)	<u>5,177,752</u>
Total unexpended plant funds	<u>5,890,252</u>

Invested in plant:

Long-term debt (note 4)	3,274,000
Net investment in plant	<u>139,829,497</u>
Total invested in plant	<u>163,103,497</u>

Total plant funds	168,993,749
-------------------	-------------

AGENCY FUNDS:

Overdraft in pooled cash and securities	216,143
Sundry liabilities	8,271
Fund balances (note 7)	<u>519,896</u>

Total agency funds	744,310
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<u>\$258,897,000</u>

STATEMENT OF CURRENT REVENUES, EXPENDITURES, AND TRANSFERS

Year Ended June 30, 1969

<i>Revenues</i>	<i>Unrestricted</i>	<i>Restricted</i>	<i>Total</i>
EDUCATION AND GENERAL:			
Endowment income (note 1):			
Duke Endowment	\$ 6,143,302	—	6,143,302
Funds held by University	2,492,042	354,389	2,846,431
	<u>8,635,344</u>	<u>354,389</u>	<u>8,989,733</u>
Loyalty funds	605,906	—	605,906
Gifts and grants:			
Research programs	—	16,289,915	16,289,915
Training programs	—	5,376,378	5,376,378
Special programs	—	2,871,201	2,871,201
Libraries	—	170,563	170,563
Instruction and departmental research	—	1,017,767	1,017,767
Student services	—	9,600	9,600
Current expenses (note 6-c)	2,027,727	—	2,027,727
	<u>2,027,727</u>	<u>25,735,424</u>	<u>27,763,151</u>
Tuition and fees	11,281,659	24,530	11,306,189
Investment income	154,944	302,017	456,961
Organized activities relating to educational dependents	99,544	—	99,544
Sales and services of educational departments	167,043	1,192,552	1,359,595
Received from medical and surgical private diagnostic clinics	—	3,231,079	3,231,079
Indirect expense recovery on sponsored research and training activities and contract services	3,468,812	—	3,468,812
	<u>26,440,979</u>	<u>30,839,991</u>	<u>57,280,970</u>
RELATED ACTIVITIES:			
Duke Hospital	21,591,512	—	21,591,512
Highland Hospital	1,533,203	—	1,533,203
	<u>23,124,715</u>	<u>—</u>	<u>23,124,715</u>
STUDENT AID:			
Gifts for fellowships and scholarships	—	1,250,087	1,250,087
Designated scholarships	—	334,097	334,097
Endowment income	—	322,963	322,963
Investment income	—	4,791	4,791
	<u>—</u>	<u>1,911,938</u>	<u>1,911,938</u>
AUXILIARY ENTERPRISES			
	7,703,345	—	7,703,345
	<u>57,269,039</u>	<u>32,751,929</u>	<u>90,020,968</u>
Add excess restricted funds expenditures and transfers over revenues received during year	—	1,111,270	1,111,270
Total revenues earned	<u>\$57,269,039</u>	<u>33,863,199</u>	<u>91,132,238</u>

STATEMENT OF CURRENT REVENUES, EXPENDITURES, AND TRANSFERS—Continued

<i>Expenditures and Transfers</i>	<i>Unrestricted</i>	<i>Restricted</i>	<i>Total</i>
EDUCATIONAL AND GENERAL:			
Instruction and departmental research	\$12,321,723	2,205,997	14,527,720
Organized activities relating to educational departments	507,280	—	507,280
Sponsored research	—	17,786,887	17,786,887
Other separately budgeted research	205,945	—	205,945
Training programs	—	6,385,557	6,385,557
Special programs	—	3,569,844	3,569,844
Libraries	2,155,843	193,727	2,349,570
Student services	1,756,747	9,600	1,766,347
Operation and maintenance of physical plant	3,537,722	—	3,537,722
General administration	3,508,843	—	3,508,843
	<u>23,994,103</u>	<u>30,151,612</u>	<u>54,145,715</u>
RELATED ACTIVITIES:			
Duke Hospital, including provision for doubtful accounts of \$2,761,847	20,617,864	—	20,617,864
Highland Hospital	1,618,004	—	1,618,004
	<u>22,235,868</u>	<u>—</u>	<u>22,235,868</u>
STUDENT AID:			
Fellowships and scholarships	1,896,107	2,155,305	4,051,412
Other	—	92,525	92,525
	<u>1,896,107</u>	<u>2,247,830</u>	<u>4,143,937</u>
AUXILIARY ENTERPRISES			
	<u>8,073,021</u>	<u>—</u>	<u>8,073,021</u>
	56,199,099	32,399,442	88,598,541
Add (deduct) transfers:			
Current funds—net	108,336	(108,336)	—
Student loan funds	14,005	1,000	15,005
Endowment funds—net	—	(10,686)	(10,686)
Plant funds—net	627,669	1,581,779	2,209,448
Total expenditures and transfers	56,949,109	33,863,199	90,812,308
Total revenues earned, from previous page			
	<u>57,269,039</u>	<u>33,863,199</u>	<u>91,132,238</u>
Excess of revenues over expenditures and transfers (note 7)			
	<u>\$ 319,930</u>	<u>—</u>	<u>319,930</u>

See accompanying notes to financial statements.

STATEMENT OF CHANGES IN CURRENT FUNDS BALANCES

Year Ended June 30, 1969

	<u>Current</u> <u>Total</u>	<u>Unrestricted</u> <u>Unallocated</u>	<u>Fund</u> <u>Allocated</u> <u>(note 6-d)</u>	<u>Current</u> <u>Restricted</u> <u>Funds</u>
BALANCE at June 30, 1968, as previously reported	\$1,110,015	1,110,015	—	3,359,783
ADDITIONS (deductions):				
Restatement of beginning fund balances through reclassifications—net (note 7)	366,795	(143,091)	509,886	(462,065)
Adjustment to hospital accounts receivable, inventories and deferred charges applicable to prior years—net (note 7)	<u>2,434,955</u>	<u>2,434,955</u>	<u>—</u>	<u>—</u>
BALANCE at June 30, 1968, as adjusted	3,911,765	3,401,879	509,886	2,897,718
ADD:				
Excess of revenues over expenditures and transfers of general fund	319,930	319,930	—	—
Decrease in purchase orders and other encumbrances at June 30, 1969 over June 30, 1968	<u>—</u>	<u>—</u>	<u>—</u>	<u>329,473</u>
	4,231,695	3,721,809	509,886	3,227,191
DEDUCT:				
Excess of expenditures and transfers over revenues of restricted funds	<u>—</u>	<u>—</u>	<u>—</u>	<u>1,111,270</u>
	4,231,695	3,721,809	509,886	2,115,921
Allocated for reappropriation to future operations	<u>—</u>	<u>(1,140,925)</u>	<u>1,140,925</u>	<u>—</u>
BALANCE at June 30, 1969	<u>\$4,231,695</u>	<u>2,580,884</u>	<u>1,650,811</u>	<u>2,115,921</u>

See accompanying notes to financial statements.

STATEMENT OF CHANGES IN STUDENT LOAN FUND BALANCES

Year Ended June 30, 1969

BALANCE at June 30, 1968		\$ 4,032,870
ADDITIONS:		
Endowment income	\$ 3,776	
Investment income	11,275	
Interest on notes	26,540	
Gifts	3,898	
Appropriations from U. S. Government	315,124	
Transfers from current fund:		
Unrestricted	14,005	
Restricted	1,000	
Excess of market value over cost of		
investments resulting from withdrawal		
of student loan funds from pooled investments	46,123	
Other	1,312	423,053
		<u>4,455,923</u>
DEDUCTIONS:		
Cancellation of loans	33,320	
Transfers to endowment funds	1,069	34,389
BALANCE at June 30, 1969		<u>\$ 4,421,534</u>

See accompanying notes to financial statements.

STATEMENT OF CHANGES IN ENDOWMENT AND SIMILAR FUNDS BALANCES

Year Ended June 30, 1969

	<u>Total</u>	<u>Permanent Endowment Funds</u>	<u>Quasi Endowment Funds</u>
BALANCE at June 30, 1968	\$64,679,128	29,976,812	34,702,316
ADDITIONS:			
Gifts	1,253,551	1,251,651	1,900
Net gains on investments	4,468,727	1,817,435	2,651,292
Endowment income	20,026	20,026	—
Transfer from student loan funds	1,069	1,069	—
Adjustments to fund balances arising from separation of investments (note 1)	—	3,860,275	(3,860,275)
	<u>70,422,501</u>	<u>36,927,268</u>	<u>33,495,233</u>
DEDUCTIONS:			
Excess of market value over cost of investments charged to endowment funds upon withdrawal of student loan funds from pooled investments	46,123	30,084	16,039
Transfers to:			
Plant funds	1,497,000	—	1,497,000
Current restricted funds	10,686	10,686	—
	<u>1,553,809</u>	<u>40,770</u>	<u>1,513,039</u>
BALANCE at June 30, 1969 (note 1)	<u>\$68,868,692</u>	<u>36,886,498</u>	<u>31,982,194</u>

See accompanying notes to financial statements.

STATEMENT OF CHANGES IN UNEXPENDED PLANT FUND BALANCES

Year Ended June 30, 1969

	<u>Total</u>	<u>Capital Expenditures</u>	<u>Renewals and Replacements</u>	<u>Retirement of Indebtedness</u>
BALANCE at June 30, 1968, as previously reported	\$ 5,297,803	5,584,247	(455,317)	168,873
ADDITIONS:				
Restatement of beginning fund balances through reclassifications (note 7)	<u>534,883</u>	<u>534,883</u>	<u>—</u>	<u>—</u>
BALANCE at June 30, 1968, as adjusted	5,832,686	6,119,130	(455,317)	168,873
ADDITIONS:				
Gifts	8,827,910	8,827,910	—	—
Investment income	307,705	307,705	—	—
Endowment income	1,923	1,923	—	—
Transfers from auxiliary enterprises and related activities (note 2-a)	1,022,334	225,374	604,233	192,727
Received from medical and surgical private diagnostic clinics	548,209	548,209	—	—
Transfers from other funds:				
Unrestricted	627,669	627,669	—	—
Restricted	1,581,779	1,581,779	—	—
Endowment	1,497,000	1,497,000	—	—
Sale of property (note 4-c)	515,568	515,568	—	—
Other	16,402	(10,793)	27,195	—
	<u>20,779,185</u>	<u>20,241,474</u>	<u>176,111</u>	<u>361,600</u>
DEDUCTIONS:				
Capital expenditures	13,867,693	13,845,271	22,422	—
Renewals and replacements	542,014	519,680	22,334	—
Other	1,191,726	1,046,183	635	144,908
	<u>15,601,433</u>	<u>15,411,134</u>	<u>45,391</u>	<u>144,908</u>
	<u>5,177,752</u>	<u>4,830,340</u>	<u>130,720</u>	<u>216,692</u>
Intra-fund transfers	<u>—</u>	<u>817,854</u>	<u>(648,981)</u>	<u>(168,873)</u>
BALANCE at June 30, 1969	<u>\$ 5,177,752</u>	<u>5,648,194</u>	<u>(518,261)</u>	<u>47,819</u>

See accompanying notes to financial statements.

STATEMENT OF CHANGES IN NET INVESTMENT IN PLANT

Year Ended June 30, 1969

BALANCE at June 30, 1968		\$139,256,613
ADDITIONS:		
Expended from current unrestricted fund		1,535,734
Retirement of long-term debt—unexpended plant funds (note 4-c)		3,110,052
Expended from current restricted funds	\$ 3,401,625	
Less property purchased under contracts—title vested in grantor—net	656,203	2,745,422
Unexpended plant funds	<u>13,867,693</u>	
Less off campus building constructed with funds received from National Science Foundation—title vested in North Carolina State University	265,306	13,602,387
Gifts in kind (note 6-c)		<u>2,345,119</u>
		162,595,327
DEDUCTIONS—sales and other disposals:		
Married student apartments (note 4-c)	2,700,186	
Land—Duke Forest	60,055	
Miscellaneous	<u>5,589</u>	
		<u>2,765,830</u>
BALANCE at June 30, 1969		<u>\$159,829,497</u>

See accompanying notes to financial statements.

NOTES TO FINANCIAL STATEMENTS

June 30, 1969

(1) Endowment Funds

- (a) The endowment funds do not include that portion of the indivisible Corpus of The Duke Endowment, the income of which accrues to Duke University subject to the terms of a Trust Indenture dated December 11, 1924, whereby Mr. James B. Duke established a trust to be administered for educational and charitable purposes.
- (b) During the year ended June 30, 1969, but effective as of July 1, 1968 for financial reporting purposes, certain general endowment funds were reclassified to quasi endowment funds. In the opinion of University Counsel, such quasi endowment funds are unrestricted and both principal and income can be expended at the discretion of the Board of Trustees.
- (c) Subsequent to June 30, 1969, pooled investments owned by the endowment funds were divided into separate pools for permanent and quasi endowment funds. Securities with relatively low income (dividends and interest) yields but with high appreciation potential were placed in the investment pools for quasi endowment funds, and securities with relatively high income yields but with low appreciation potential were placed in the investment pools for permanent endowment funds. Since the participation in the original investment pools was on the basis of market, the separation was made using market values at June 30, 1969. This action did not affect the overall book value of the endowment funds; however, the retention of historical costs for individual securities made it necessary to adjust fund balances of permanent and quasi endowment funds for the difference between the book values of securities exchanged and received. The separation was made to provide the University with maximum income yield from quasi endowment funds since it is the University's intention to use a portion of realized gains, as well as dividends and interest, on investments of quasi endowment funds to finance current operations and additions to plant.
- (d) Included in permanent endowment funds are income restricted endowment funds as follows:

<i>Income Restricted for</i>	<i>Fund Balance at June 30, 1969</i>
General libraries	\$ 1,650,533
Professorships	6,252,976
Research, training and special programs	3,230,759
Student aid and loans	7,668,854
	<u>\$18,803,122</u>

(2) Plant Funds

- (a) Land, buildings, equipment, library books, etc. are stated in the balance sheet at amounts shown on the books substantially at cost of the original assets acquired. In accordance with generally accepted institutional accounting practices, depreciation on buildings and equipment is not reflected in the accompanying financial statements, and assets discarded are removed from the plant accounts only when it is practicable to determine the original cost. Further, provisions for replacement of certain dormitory and other auxiliary service facilities have been charged to auxiliary enterprises and are funded by transfers of pooled cash to unexpended plant funds. Plant investments at June 30, 1969 are comprised of the following:

Land and land improvements	\$ 13,273,169
Buildings	91,330,491
Furniture and equipment	34,082,576
Library books	11,077,331
Fine arts collection	1,033,978
Construction in progress	12,305,952
	<u>\$163,103,497</u>

Notes to Financial Statements—Continued

- (b) The amount due to endowment funds represents advances to plant funds for additions and renovation to the hospital and medical science buildings. The loan bears interest at the Morgan Guaranty Trust Co. prime rate and is payable on February 1, 1971.
- (c) Unexpended plant fund balances at June 30, 1969, are shown after deducting deficits of \$4,728,191 which have arisen from expenditures in excess of funds received for several facility projects. These deficits will be recovered in future years from outside gifts and transfers from current funds.

(3) Investments

A summary of the investments in the several funds at June 30, 1969, in comparison with quoted market value, is as follows:

	<i>Cost or Amortized Value</i>	<i>Quoted Market Value</i>
Current funds:		
Unrestricted	\$ 2,534,683	2,508,115
Restricted	5,113,421	5,885,966
Student loan funds	113,232	145,737
Endowment and similar funds	67,631,986	94,069,156
Plant funds	3,766,508	3,806,236
Agency funds	240,278	240,647
	<u>\$79,400,108</u>	<u>106,655,857</u>

(4) Long-term Debt

- (a) A summary of the long-term debt at June 30, 1969, is set forth below:

<i>Description</i>	<i>Interest Rate</i>	<i>Balance</i>
Serial bonds payable in annual installments (currently \$40,000 with annual amount increasing periodically to the year 2005)	3-5/8%	\$2,854,000
Note payable in annual installments of \$60,000; under certain conditions the terms of the agreement provide for adjustment of the annual payment	None	420,000
		<u>\$3,274,000</u>

- (b) The 3-5/8% serial bonds are secured by a first mortgage on two dormitories (carried at a cost of approximately \$3,950,000) for men students and first liens on and pledges of the net revenues derived each year from the operations of the facilities and annual general fees paid by all enrolled undergraduate men students to the extent of \$80,000. Further, under the terms of the loan agreement, the University has deposited with the Trustees, \$310,000 principal amount of U. S. Treasury Bonds to secure the payment of principal and interest.
- (c) Effective August 30, 1968, the University sold the apartment facility for married students for \$2,750,568. Of this amount, \$2,235,000 was used to retire serial bonds secured by a first mortgage on the apartment facility and the remainder (\$515,568) was added to the unexpended plant funds.

Notes to Financial Statements—Continued

(5) Retirement Plans

Academic and certain other salaried employees of the University are participants in the Retirement Annuity Plan sponsored by the Teachers Insurance and Annuity Association. The University also contributes to this Plan for the benefit of these employees. In addition, the University has a non-contributory retirement plan for other employees who are not eligible to participate in the Retirement Annuity Plan. The policy followed is to fund annually the accrued retirement expense. The total cost in 1969 for required contributions to these plans amounted to \$2,083,332, which includes a portion of the prior service cost for the non-contributory plan which is being amortized over a 30-year period.

(6) Commitments, Contingencies, and Other Matters

(a) Open contracts for construction of buildings and equipment amounted to approximately \$3,148,000 at June 30, 1969.

(b) Medicare cost reports filed to support hospital revenue from Medicare patients for the three years ended June 30, 1969 are subject to final determination by the Social Security Administration. In the opinion of the University Administration, there is adequate provision for any adjustments which may result from examination of such reports by representatives of the Social Security Administration.

(c) Under an agreement dated May 15, 1969, the University agreed to assume responsibility for the future maintenance and operation of Sea Level General and Children's Hospital in consideration for the transfer to the University of all its assets. The hospital was recorded in the accounts of the University at June 30, 1969 as a gift by recording the land and buildings (at appraised value) and the equipment (at book value) in the Plant Fund with the corresponding credit to "gifts in kind" and the operating accounts (at book value) in the Current Unrestricted Fund with the corresponding credit to "gifts—current expenses." Further, none of the operations of the hospital for the year ended June 30, 1969 have been included in the statement of current revenue, expenditures, and transfers since the University did not assume control of the hospital until June, 1969.

(d) The allocated current unrestricted fund balance in the statement of changes in current funds balances is comprised of certain unrestricted gifts (principally from The Ford Foundation under a matching gift program), and the accumulated operating fund balances of Highland Hospital and Sea Level General and Children's Hospital at June 30, 1969. The unrestricted gifts will be used by the University to finance future operations, additions to plant, etc. at the discretion of the Board of Trustees. Further, the Board of Trustees has directed that operating fund balances of Highland Hospital and Sea Level General and Children's Hospital be expended only for the operations of the respective hospitals.

(7) Changes in Financial Accounting and Reporting

Effective July 1, 1968, the University restated certain beginning fund balances, through reclassifications, to more appropriately reflect the nature and purpose of such funds in accordance with the recommendations set forth in the revised edition "College and University Business Administration" (American Council on Education), the authoritative literature on accounting for the educational field. Such reclassifications included, principally, the transfer of unrestricted funds from Current Restricted Funds to the Current Unrestricted Fund, and the transfer of University owned operations from Agency Funds to the Current Unrestricted Fund and Plant Funds.

Notes to Financial Statements—Continued

During the year, the University refined its accounting policies and procedures (including the adoption of a new chart of accounts on July 1, 1968) for the purpose of improving its financial accounting and reporting. The effect of such changes has been reflected in the accompanying financial statements and adjustments for those items applicable to prior years have been made to the beginning fund balance of the Current Unrestricted Fund as follows:

Write-off of excess provision of allowance for doubtful accounts applicable to hospital accounts receivable	\$2,355,499
Change in method of recording net hospital revenue applicable to Medicare and welfare patients	142,143
Record inventory of books of Duke University Press at July 1, 1968; previously, the Press was carried in Agency Funds and the cost of books charged to expense as incurred	185,810
	<u>2,683,452</u>
Less:	
Write-off of deferred charges at July 1, 1968 applicable to the Marine Laboratory and Summer School resulting from change in their fiscal years	\$ 64,657
Write-off of unbilled repair costs at July 1, 1968 because of change in billing work orders to departments on a current basis rather than on a completed basis	<u>183,840</u>
	<u>248,497</u>
	<u>\$2,434,955</u>

With respect to the above changes, it is not practicable to determine their effect on the University's operations for the year ended June 30, 1969.

(8) Significant Event Subsequent to Date of Accountants' Report

On November 3, 1969, a suit was filed in the United States District Court, Durham, North Carolina, by George P. Shultz, Secretary of Labor, United States Department of Labor against Duke University claiming that Duke University has not fully complied with the Fair Labor Standards Act during the period since at least December 8, 1966. The only disparity between the University and the Department involves complex legal interpretations regarding the extent of coverage and of the law. On November 19, 1969, the University filed an Answer to this Complaint denying each and every allegation of noncompliance to the provisions of the Act. While it is impossible to predict the final settlement of this litigation, the University believes that the sufficiency of its position will be sustained regarding every aspect of the Department's suit.

SPENDING IN THE MAJORITIES—A PROPOSAL FOR A FUNDING

FINANCIAL REPORT

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PRINCIPAL			INCOME				
Balance July 1, 1968	Additions	Balance June 30, 1969	Balance July 1, 1968	Investment Income	Others Receipts	Disbursements	Balance June 30, 1969
GENERAL:							
\$57,873.30	(4,264.07)	53,609.23	\$	2,942.49	.....	2,942.49	.....
WILLIAM B. BELL ENDOWMENT FUND Established 1951 by bequest from William B. Bell; to be added to the general endowment of the University.							
98,793.10	(7,484.65)	91,308.45		5,164.45		5,164.45	
CENTENNIAL ENDOWMENT FUND Gifts from a number of individuals in connection with the Centennial celebration of Duke Uni- versity; the income to be used annually, in the judgment of the Trustees, for the benefit of the University.							
48,351.89	(2,483.85)	45,868.04		1,713.88		1,713.88	
JOSEPH COHAN ENDOWMENT FUND Established 1959 by bequest from Joseph Cohan; to be added to the general endowment of the University.							
679,212.08	211,048.80	890,260.88		35,688.70		35,688.70	
ANGIER BUCHANAN DUKE ENDOWMENT FUND Established 1923 by bequest of Angier Buchanan Duke '05; to be added to the general endowment of the University.							
1,227,858.71	381,527.77	1,609,386.48		64,516.93		64,516.93	
B. N. DUKE ENDOWMENT FUND Established 1913 by gift from Benjamin Newton Duke; to be added to the general endowment of the University.							
1,285,714.45	399,505.46	1,685,219.91		33,778.46		33,778.46	
SARAH P. DUKE BEQUEST TO THE B. N. DUKE ENDOWMENT FUND Established 1939 by bequest from Mrs. Sarah Pearson Duke; one-half of the net income to be used for the general purposes of the University; and one-half of the net income to be used for the establishment of the B. N. Duke Scholarships.							
511,959.64	(30,332.97)	481,626.67		20,930.10		20,930.10	
DORIS DUKE ENDOWMENT FUND Established 1955 by gift from Doris Duke and allocated by the Trustees for permanent endowment.							
4,054,534.99	1,259,852.00	5,314,386.99		213,042.87		213,042.87	
J. B. DUKE ENDOWMENT FUND Established 1913 by gift from James Buchanan Duke; to be added to the general endowment of the University.							

SCHEDULE A (Continued)—Endowment Funds

PRINCIPAL		INCOME			
Balance July 1, 1968	Balance June 30, 1969	Balance July 1, 1968	Investment Income	Others Receipts	Balance June 30, 1969
337,548.48	337,548.48		17,244.79		17,244.79
WASHINGTON DUKE ENDOWMENT FUND Established 1897 by gift from Washington Duke; to be added to the general endowment of the University.					
22,890,772.07	20,922,598.54		1,231,333.87		1,231,333.87
DUKE UNIVERSITY ENDOWMENT FUND Established 1956 from gifts and grants which had been temporarily carried as funds functioning as endowment.					
546,573.77	716,408.25		28,719.31		28,719.31
C. C. DULA ENDOWMENT FUND Established 1927 by gift from Caleb C. Dula; to be added to the general endowment of the University.					
349,804.43	326,950.31		15,824.90		15,824.90
ROBERT L. FLOWERS ENDOWMENT FUND Established 1952 by bequest from Robert L. Flowers '04; to be added to the general endow- ment of the University.					
4,163,658.43	3,917,225.32		170,041.83		170,041.83
FORD FOUNDATION ENDOWMENT FUND Established 1965 by gift from the Ford Foundation; to be used to advance the academic program either by increases in faculty salaries or by meeting other pressing academic needs.					
3,805,147.94	3,582,044.80		153,943.76		153,943.76
FORD MEDICAL SCHOOL ENDOWMENT FUND Established 1956 by gift from the Ford Founda- tion; the income to be used for current instruc- tional uses of the medical school.					
800,118.04	1,048,736.31		42,041.71		42,041.71
GENERAL EDUCATION BOARD ENDOWMENT FUND Established 1923 by gift from the General Education Board; to be added to the general endowment of the University.					
1,208,201.62	1,122,299.96		60,442.96		60,442.96
GENERAL ENDOWMENT FUND Established to accumulate sundry endowment gifts; from various individuals, foundations and corporations.					
4,467,280.61	4,815,472.30		236,669.69		236,669.69
GRADUATE SCHOOL ENDOWMENT FUND Established to consolidate the Development of Graduate School Endowments; consisting of gifts by General Education Board, The Duke Endow- ment, and other miscellaneous donors in 1950.					

650,036.06	(44,786.98)	605,249.08	ELIZABETH P. HANES ENDOWMENT FUND Established 1952, being the unexpended portion of gift from Elizabeth P. Hanes, '08, for construction of a Nurses' Home; this residue being added to the general endowment.	30,903.48	30,903.48
208,566.80	70,270.26	278,837.06	WALKER P. INMAN ENDOWMENT FUND Established 1951 by gifts from Walker P. Inman; to be added to the general endowment of the University.	11,882.74	11,882.74
543,388.21	168,845.84	712,234.05	FLORENCE REYNAUD McALISTER CHAIR OF MEDICINE AND MEDICAL RESEARCH Established 1936 by gift from Mrs. Amelie McAllister Upshur; as a memorial to her sister.	28,552.05	28,552.05
129,908.75	(6,296.31)	123,612.44	DAVID OWENS ENDOWMENT FUND Established 1950 by gift from David Owens; to be added to the general endowment of the University.	4,344.34	4,344.34
403,402.18	125,348.18	528,750.36	W. R. PERKINS ENDOWMENT FUND Established 1945 by bequest from William R. Perkins; to be added to the general endowment of the University.	21,196.52	21,196.52
605,571.34	(70,243.51)	535,327.83	WILLIAM NEAL REYNOLDS ENDOWMENT FUND Established 1950 by gift from William N. Reynolds, '86; to be added to the general endowment of the University.	48,468.96	48,468.96
113,806.61	32,329.26	146,135.87	LUTHER P. TAPP MEMORIAL ENDOWMENT FUND Established 1951 by gift from Mr. and Mrs. L. B. Jenkins, '10, and supplemented subsequently by additional gifts in memory of her father, Luther P. Tapp; the income to be used to supplement salaries of professors in the general field of the Humanities.	5,466.88	5,466.88
182,157.72	(7,684.55)	174,473.17	WORD H. WOOD ENDOWMENT FUND Established 1963 by bequest from Word H. Wood; to be added to the general endowment of the University.	5,420.58	5,420.58
49,370,321.22	695,249.56	50,065,570.78	Total for General Purposes	2,490,276.25	2,490,276.25

INCOME RESTRICTED FOR OTHER PURPOSES:

GENERAL LIBRARIES:

7,128.46	2,345.68	9,474.14	AVERA BIBLE FUND Established 1895 by gift of Mrs. L. B. McCullers in memory of her husband, Willis H. Avera; the income to be used for the purchase of books for the Divinity School Library and for the support of the Avera Bible Lectures.	1,071.33	379.83	177.72	1,273.44
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SCHEDULE A (Continued)—Endowment Funds

PRINCIPAL			INCOME			
Balance July 1, 1968	Additions	Balance June 30, 1969	Balance July 1, 1968	Investment Income	Others Receipts	Disbursements June 30, 1969
2,419.46	786.79	3,206.25	540.20	128.56	—	604.00
ISAAC ERWIN AVERY FUND Established 1905 from the proceeds of the sale of the publication of "Idle Comments," a collection of the writings of Isaac Erwin Avery, '94; the income to be used for the purchase of books in the field of journalism.						
439.82	87.44	527.26	97.13	14.85	—	111.98
LOUIS W. BAILEY MEMORIAL FUND Established 1958 by gift of A Purnell Bailey, B. D., '48, in memory of his father, Louis William Bailey; the income to be used for purchasing books for the Divinity School Library.						
955.40	296.13	1,251.53	122.34	50.11	—	172.45
JOHN SPENCER BASSETT MEMORIAL FUND Established by miscellaneous gifts in memory of John Spencer Bassett, '88, formerly Professor in Trinity College; the income to be used for the purchase of books for the Library.						
677,296.22	191,638.94	868,935.16	32,427.36	32,406.45	—	23,506.63
MARY DUKE BIDDLE LIBRARY FUND Established 1951 by gift from Mary Duke Biddle, '07, and supplemented subsequently by additional gifts; the income to be used to maintain and operate the library of Duke University.						
11,814.71	3,671.00	15,485.71	2,154.97	620.75	—	2,624.02
JOSEPH G. BROWN BOOK FUND Established 1921 by gifts of various individuals in honor of Joseph G. Brown, '75, chairman of the Board of Trustees 1917-27; the income to be used for the purchase of books for the library.						
2,790.28	1,072.02	3,862.30	347.37	154.81	—	347.37
CLASS OF 1909 FUND Established by members of the Class of 1909; the income to be used for the purchase of books for the General Library.						
493,047.56	115,375.16	608,422.72	19,071.85	19,519.60	115.00	19,738.58
GEORGE WASHINGTON FLOWERS MEMORIAL FUND Established 1941 by bequest of William W. Flowers, '94, in memory of his father, George Washington Flowers, and supplemented in 1952 by bequest of Robert L. Flowers, '04; the income to be used for the purchase of manuscripts, books and other printed or photographed materials dealing with the life and thought of the Southern states of						
						18,967.87

FINANCIAL REPORT

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Established 1918 by gifts of several individuals, in memory of William Francis Gill, '94, for many years Professor of Latin at Trinity College; the income to be used for a collection of books in the General Library in the field of Latin.	600.85	105.31	518.25	187.91
WILLIAM B. HAMILTON FUND Established September, 1965 by gift from Professor William B. Hamilton and supplemented by additional gifts; the income to be added to principal during lifetime of donor; thereafter to be used for purchase of manuscripts of British and Imperial History.	5,812.35	142.73	142.73	
P. HUBER HANES FUND Established 1939 by gift of P. Huber Hanes, '00; the income to be used as follows: three-fifths for the support of the P. Huber Hanes scholarships; one-fifth to the P. Huber Hanes, Jr. Scholarship; and one-fifth to the Duke University Press.	9,897.77	1,540.98		11,438.75
HENRY HARRISON JORDAN MEMORIAL FOUNDATION Established 1947 by gifts from Mrs. George W. B. Everett Jordan, '18, H. W. Jordan, Charles E. Jordan, '23, Mrs. H. C. Sprinkle, Jr., '24, and Frank B. Jordan, '27, children of Reverend Henry Harrison Jordan, of the residue of the estate of their father, supplemented by additional gifts; the income to be used for the support of the Ministers' Loan Library of the Duke Divinity School.	69,766.08	23,123.38	2,142.75	23,777.45
THE WILLIAM ARTHUR KALE, JR., MEMORIAL FUND Established 1964 by gift from W. A. Kale, '25, and Ruth Rogers Kale, in memory of William Arthur Kale, Jr., '38; the income to be used annually to purchase books and other materials in the areas of fine arts and religious musicology in the library of the Divinity School of Duke University.	4,193.22	487.34		600.15
J. WALTER LAMBETH FUND Established January, 1966 by transfer from J. Walter Lambeth Current Restricted Fund; the income to be used for books on the subject of the promotion of international understanding.	19,301.36	527.40		527.40
LIBRARY ENDOWMENT FUND Established 1959 by contributions from a number of individuals in connection with the Centennial celebration of Duke University; the income to be used for the General Library of Duke University.	17,820.78	529.93	529.93	
3,727.33	2,085.02	5,812.35		
53,226.83	16,539.25	69,766.08		
3,325.75	667.47	4,193.22		
16,223.77	3,077.59	19,301.36		
10,783.72	7,037.06	17,820.78		

SCHEDULE A (Continued)—Endowment Funds

PRINCIPAL		INCOME			
Balance July 1, 1968	Additions	Balance June 30, 1969	Investment Income	Others Receipts	Disbursements
3,336.69	1,037.10	4,373.79	175.37		600.74
ORMOND MEMORIAL FUND Established 1924 by Dr. J. M. Ormond, '02, and Mrs. Ormond, in memory of his mother and father, Mr. and Mrs. J. J. Ormond; the income to be used for the purchase of a collection of books on the rural church for the Library of the Divinity School at Duke University.					
2,401.70	1,084.07	3,485.77	91.58		177.01
LUCIE PARKER FUND Established January, 1966 by gift from Professor Harold T. Parker and supplemented by additional gifts; the income to be used to strengthen the holdings of Duke University Library.					
3,336.69	1,037.10	4,373.79	175.37	297.42	430.35
GRATTON WILLIAMS FUND Established 1920 by bequest of Gratton Williams; the income to be used for the general purposes of Duke University, particularly for the development of the Library.					
3,477.93	1,080.48	4,558.41	182.72		377.04
JAMES J. WOLFE MEMORIAL FUND Established 1921 by his friends and former students in memory of Dr. James J. Wolfe, Professor of Biology at Trinity College from 1904 until his death in June, 1920; the income to be used to purchase periodicals relating to biology.					
1,992.05	1,062.25	3,054.30	122.40	1,203.84	(294.08)
LIZZIE TAYLOR WRENN FOUNDATION FUND Established 1921 by gift from Mrs. May Wrenn Morgan, '08, and her husband, John Allen Morgan, '06, in memory of Mrs. Morgan's sister, Lizzie Taylor Wrenn, '12; the income to be used for purchase of books for the Library of Duke University.					
1,299,929.39	350,603.32	1,650,532.71	59,778.38	115.00	49,360.92
56,313.42	20,782.15	77,095.57	2,077.35		4,671.36

PROFESSORSHIPS:

VIRGINIA FLOWERS BAKER PROFESSORSHIP IN ORTHOPAEDIC SURGERY
Established April, 1966 by gifts from various donors in memory of Mrs. Virginia Flowers Baker and by transfer from the Virginia Flowers Baker Orthopaedic Loan Fund, the Taylor Foundation Orthopaedic Current Restricted Fund, the Ann Black Orthopaedic Loan Fund, the Crutched

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and the Dennis Campbell Andrews Orthopaedic Loan Fund; the income to be used to support a professorship in Orthopaedic Surgery.		225,467.76	225,467.76	F. BAYARD CARTER CHAIR OF OBSTETRICS AND GYNECOLOGY	225,467.76	253,633.36	(256,763.13)	2,790,396.49	202,377.90	143,275.49	5,965.19	144,512.88	91,105.70
Established 1969 by a gift from the F. Bayard Carter Society of Obstetricians and Gynecologists, formerly the Nick Carter Travel Club; the income to be utilized toward the support of said chair.													
THE JAMES B. DUKE PROFESSORSHIP FUND													
Established 1952 by gift from The Duke Endowment; the income to be used for the purpose of attracting and/or developing distinguished or outstanding professors at the University.													
GIBBONS' MENTAL HEALTH FUND													
Established 1963 by bequest from John P. Gibbons; to be used to establish a J. P. Gibbons Professorship of Psychiatry.													
HANES CORPORATION FOUNDATION PROFESSORSHIP													
Established December 1966 by gift from the Hanes Corporation Foundation; the income to be used to establish a graduate school of business administration.													
GURNEY HARRISS KEARNS DISTINGUISHED PROFESSORSHIP													
Established 1966 by gift from Mr. Amos R. Kearns, 27; the income to be used for support of the Distinguished Professorship of Religion.													
CORDELIA SCAIFE MAY CHAIR OF REPRODUCTIVE BIOLOGY AND FAMILY PLANNING													
Established 1967 by gift from Cordelia Scaife May; the income to be used for research and service responsibilities directly related to advancement in the field of fertility control.													
R. J. REYNOLDS PROFESSORSHIP IN SCHOOL OF MEDICINE													
Established December, 1965 by gift from the R. J. Reynolds Tobacco Company; the income to be used for a professorship in the School of Medicine.													
R. J. REYNOLDS PROFESSORSHIP IN CHEMISTRY													
Established December 1966 by gift from the R. J. Reynolds Tobacco Company; the income to be used for a professorship in the Department of Chemistry.													

33,906.45

8,218.33

19,557.92

SCHEDULE A (Continued)—Endowment Funds

PRINCIPAL		INCOME			
<i>Balance July 1, 1968</i>	<i>Balance June 30, 1969</i>	<i>Balance July 1, 1968</i>	<i>Investment Income</i>	<i>Others Receipts</i>	<i>Balance June 30, 1969</i>
249,994.76	40,527.84	290,522.60	8,226.43		11,520.25
R. J. REYNOLDS TOBACCO COMPANY FUND FOR BUSINESS ADMINISTRATION Established 1967 by gift from the R. J. Reynolds Tobacco Company; the income to be used to assist in the development of faculty with the ultimate objective of converting the fund into the R. J. Reynolds Tobacco Company Profes- sorship in Business Administration.					
270,010.26	52,158.56	322,168.82	8,820.09	8,243.28	9,156.44
J. BUREN SIDBUKY CHAIR IN PEDIATRICS Established 1965 by gift from Dr. J. Buren Sidbury, '08; the income to be used for support- ing the activities of a Chair in Pediatrics at the Duke University Medical School.					
36,858.15	15,844.34	52,702.49	1,256.34	7,654.75	
THE HERSEY E. AND BESSIE SPENCE CHAIR IN CHRISTIAN EDUCATION Established 1963 by bequest from Hersey E., '07 and Bessie Spence, '06; the income to be used to establish a Chair in Christian Education.					
5,430,111.76	822,864.59	6,252,976.35	233,090.35	5,965.19	213,475.43
RESEARCH, TRAINING, AND SPECIAL PROGRAMS:					
89,619.19	45,397.55	135,016.74	3,029.88	3,029.88	
GEORGE V. ALLEN FUND Established December, 1965 by gift from Mr. George V. Allen; the income to be added to principal until it reaches \$250,000 at which time the income is to be used for the support of a chair in International Relations.					
7,161.51	3,425.19	10,586.70	410.13	1,000.00	2,466.22
ALUMNI ACTIVITIES FUND Established 1939 by gift of P. Frank Hanes, '11, in connection with the Centennial celebration of Duke University; the income to be used for the support of the activities of the Alumni Office.					
25,396.05	4,814.12	30,210.17	873.76		3,349.88
BEQUEST PROGRAM FUND Established 1963 to accumulate unrestricted gifts from bequests.					
119,608.58	74,696.43	194,305.01	4,612.56	535.59	4,576.41
THOMAS C. BOST FOUNDATION FUND Established December 17, 1965 by gift from Dr. Thomas C. Bost; the income to be used to					
					4,612.56

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5,504.74	1,710.78	7,215.52	CHRISTIAN EDUCATION FUND Established 1955 by gift from Mrs. Edgar S. Bowling; the income to be transferred annually to the Duke University Loyalty Fund.	6,810.05	289.22	7,099.27
889.73	218.30	1,108.03	MARY ALICE COOK MEMORIAL FUND Established 1956 by gift from Franklin H. Cook, '36, in memory of Mary Alice Rhodes Cook, '36; the income to be transferred annually to the Duke University Loyalty Fund.	36.90	36.90	36.90
4,790.66	1,263.49	6,054.15	THE HARVEY B. CRAVEN FUND Established May 9, 1960 by gift of Harvey B. Craven, '96; the income to be transferred annually to the Duke University Loyalty Fund.	213.62	213.62	213.62
3,739.41	1,029.13	4,768.54	GROVELL SCIENCE LECTURE FUND Established 1921 by contributions from various individuals; the income to be used for annual lectures on scientific subjects.	1,824.80	174.02	1,998.82
59,988.95	14,891.53	74,880.48	DISCRETIONARY FUND OF THE DEAN OF THE CHAPEL Established 1956 by gift from Brewster, '32, and Edith Snow, '32; for special activities and services in connection with the work of the Dean of the Chapel.	8,672.90	2,518.29	9,746.53
2,780.57	864.04	3,644.61	DUKE MEMORIAL CHAPEL MAINTENANCE FUND Established 1930 by James A. Thomas; the proceeds to be used toward the maintenance of the Duke Memorial Chapel.	3,374.49	146.11	3,520.60
2,780.57	864.04	3,644.61	DUKE MONUMENT FUND Established to provide for the perpetual maintenance of the statue of Washington Duke.	2,295.76	146.11	2,441.87
4,038.43	3,386.40	7,444.83	DUKE-ADAMS FUND Established in December 1966 by a gift from Aurelia Adams Dukes and Charles A. Dukes Sr. in memory of their parents Mr. and Mrs. H. E. Adams and the Reverend Mr. and Mrs. M. F. Dukes; one-half of the income to be paid annually to the Loyalty Fund in the name of Charles A. Dukes Sr. and one-half to be added to principal.	167.07	167.07	167.07
222.66	63.65	286.31	EASON PRESBYTERIAN STUDENT FUND Established 1953 by gift from W. W. Eason; the income to be available for a Presbyterian ministerial student.	120.88	10.80	131.68

SCHEDULE A (Continued)—Endowment Funds

PRINCIPAL		INCOME			
Balance July 1, 1968	Balance June 30, 1969	Balance July 1, 1968	Investment Income	Others Receipts	Balance June 30, 1969
16,680.61	21,864.48	15,154.48	876.52	.....	16,031.00
JOHN MCLEIRE FLOWERS LECTURE FUND Established 1915 by gift of B. N. Duke in memory of John McLeire Flowers, '00; the income to be used for lectures dealing with the subject of Christian citizenship.					
991.38	1,301.05	142.08	34.38	.....	176.46
THE FORESTRY ALUMNI ASSOCIATION FUND Established 1962 by gift from Duke University Forestry Alumni Association; the income to be used to purchase books for the F. X. Schumacher Statistical Library or for other purposes of the School of Forestry, as directed by the Forestry Alumni Association.					
30,471.72	37,253.84	.....	1,171.86	.....	.....
JESSE T. AND LOVIE BROOKS FRIZZELLE MEMORIAL FUND Established 1954 by gifts from Mark T. Frizzelle, '03, and supplemented by additional gifts from J. Paul Frizzelle, Sr., '04, Jasper B. Frizzelle, '09, and John L. Frizzelle, Sr., '12; the income to be transferred annually to the Duke University Loyalty Fund					
19,228.46	59,779.76	443.38	894.98	.....	1,338.36
MARK T. FRIZZELLE FUND Established 1967; disposition of income has not been determined.					
265,527.11	344,693.70	157,938.64	10,278.32	67,429.20	179,274.77
F. M. HANES BEQUEST TO DEPARTMENT OF MEDICINE Established 1951 by bequest from F. M. Hanes; comprised of 20% of the proceeds from the Trust; 20% of the income to be added to principal and the remainder to be used for the promotion of the highest standards of medical teaching and for medical research.					
265,527.11	344,693.70	84,001.71	10,278.32	51,058.03	140,047.60
F. M. HANES BEQUEST TO SCHOOL OF MEDICINE Established 1951 by bequest from F. M. Hanes; comprised of 20% of the proceeds from the Trust; 20% of the income to be added to principal and the remainder to be used for the promotion of the highest standards of medical training and for medical research.					
11,018.15	14,524.49	28,873.74	383.37	4,806.15	29,684.98
FREDERIC M. HANES MEMORIAL TRUST FUND Established 1959 by bequest from Mrs. Elizabeth P. Hanes; comprised of 20% of the proceeds from the Trust; 20% of the income to be added to principal and the remainder to be used for the promotion of medical training and medical					

P. HUBER HANES FUND Established 1939 by gift of P. Huber Hanes, '00; the income to be used as follows: three-fifths for the support of the P. Huber Hanes Scholarships; one-fifth to the P. Huber Hanes, Jr. Scholarship; and one-fifth to the Duke University Press.					
25,078.05	4,411.17	29,489.22	FRANKLIN S. HICKMAN MEMORIAL FUND Established July 1966 by gift of Mrs. Vera Castell Hickman in memory of her husband, Franklin Simpson Hickman; not less than 2/3 of the annual income to be used as a scholarship to a candidate for an advanced degree in the Divinity School; not more than 1/3 of the annual income to be used as an honorarium to a speaker or as part of the annual public convocation sponsored by the Divinity School.	1,203.73	895.41
				380.00	1,719.14
271,896.54	59,361.11	331,257.65	WALKER P. INMAN MEMORIAL GRANT Established July 2, 1959 by bequest from Georgia Inman; 20% of the annual income to be added to principal and the remainder to be used for furthering and promoting research into the subject of heart disease and other heart ailments.	11,956.35	9,719.82
				8,498.96	13,177.21
353,993.58	328,828.14	682,761.72	THE JONES CHAIR OF ENGINEERING FUND Established 1951 by gifts from J. A. Jones Con- struction Company, Mr. Edwin L. Jones, '12, Mrs. Annabel Lambeth Jones, '12, Mr. Edwin L. Jones, Jr., '48, and Lucille Finch Jones, and supplemented by other gifts; the income to be used for the benefit of the College of Engineering as salaries, a professorship, scholarships or research.	12,261.16	12,697.00
				5,504.28	19,453.88
694.00	134.66	828.66	NELLIE MCCLEES FUND Established 1963 by gift from Nellie McClees, '02; the income to be transferred annually to the Duke University Loyalty Fund.	22.85	22.85
9,947.31	2,867.45	12,814.76	MEDICAL SCHOOL RESEARCH FUND Established 1939 by contributions from a number of individuals in connection with the Centennial Celebration of Duke University; the income to be used for medical research.	6,936.20	484.84
				6,900.00	521.04
207,058.53	85,295.71	292,354.24	I. M. ORMOND FUND FOR THE TRAINING OF MINISTERS FOR THE RURAL CHURCH. Established December 11, 1948 by gifts through the Methodist College Advance and supplemented subsequently by additional gifts; the income to be used to do research work in the rural church field of the North Carolina Conference of the Method- ist Church of the Southeastern Jurisdiction.	52,293.85	9,992.44
				26,234.70	38,543.13

SCHEDULE A (Continued)—Endowment Funds

PRINCIPAL		INCOME			
Balance July 1, 1968	Additions	Balance June 30, 1969	Investment Income	Others Receipts	Disbursements June 30, 1969
	27,934.39	27,934.39		300.00	300.00
THE PARISH-MINISTRY FUND Established 1968 by a gift from Mr. Ivy Cowan and supplemented by various other donors; the income to be used to promote the education, training, and inspiration of ministers and laymen.					
16,203.07	12,629.40	28,832.17	300.40	644.35	944.75
PICKENS MEMORIAL FUND Established in December 1966 in memory of Rev. Cornelius Miller and Emma Watts Pickens by their children; the income to be used for the benefit of the Divinity School.					
45,768.87	44,898.18	90,667.05	16,159.13	3,221.05	1,153.86
40,157.05	9,442.80	49,599.85	4,898.64	1,596.73	6,495.37
THE BOB SEIBELS, JR., M. D. MEMORIAL LABORATORY FUND Established 1956 by bequest from Robert E. Siebels, M.D.; for the purpose of establishing a Laboratory of Gynecological and Obstetrical Research at Duke University.					
14,079.83	3,360.18	17,440.01	5,487.50	568.25	5,500.00
4,692.95	1,148.32	5,841.27	2,107.22	194.27	2,301.49
837.50	111.13	948.63	52.05	34.48	86.53
1,102.51	1,238.58	2,341.09	20.17	20.17	20.17
THE ETTIE STETTHEIMER MEMORIAL HEART RESEARCH FUND Established 1957 by bequest of Ettie Stettheimer; the income to be used for research in the cause, treatment and prevention of heart disease.					
HILDA HOWES THOMAS FUND Established 1956 by gift from J. M. Thomas; the income to be used by the Music Department of Duke University to subsidize projects stimulating interest in the fine arts.					
KENNETH C. TOWE CLOCK FUND Established 1966 by gift of Mr. Kenneth E. Towe; the income to be used for the maintenance and care of the American Mahogany Inlaid Clock (circa 1790) given by Mr. Towe in 1962.					
WILLIAM P. TUDOR FUND Established 1956 by gift from William P. Tudor, '56; the income to be transferred annually, one-half to the General Athletic Scholarship Fund					

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Established January 1967 by gift of Ray J. Tysor; the income to be paid semiannually to him until his death and from that time to be used for the general purpose of the University.

1,235.74	227.11	1,462.85	LUTHER K. WILLIAMS FUND Established 1961 by gift of Luther K. Williams, '36; the income to be transferred annually to the Duke University Loyalty Fund.	38.69	38.69	.....	38.69
14,377.82	6,041.27	20,419.09	SUE EGLESTON WOODWARD MEMORIAL FUND Established January, 1966 by contributions from various donors; 80% of the income to be used by the Dean of the School of Medicine to aid any medical student in need of funds, the remainder of the income to be added to the principal of the fund annually.	343.66	522.07	.....	404.41
2,205,229.73	1,025,528.92	3,230,758.65		435,208.07	81,301.32	127,553.47	136,482.42
8,935,270.88	2,198,996.83	11,134,267.71	Total for other purposes	691,732.84	374,170.05	133,633.66	378,961.45
							823,575.10

RESTRICTED FOR STUDENT AID: FELLOWSHIPS AND SCHOLARSHIPS:

4,127.61	795.83	4,923.44	MARTHA LIPSCOMB ADAMS SCHOLARSHIP FUND Established 1964 by gift of John Q. Adams and supplemented by additional gifts in memory of Martha Lipcomb Adams, '29; the income to be used for scholarship aid to worthy students of the Woman's College of Duke University.	156.74	134.56	.....	156.00
8,092.15	2,514.34	10,606.49	FRED SOULE ALDRIDGE—DURHAM COUNTY ALUMNI SCHOLARSHIP FUND Established December, 1947 by gift of Fred S. Aldridge, '96, and Mrs. Aldridge and includes subsequent contributions from the Durham County Alumni; the income to be used for scholarship aid, preference to be given to young men from Durham County.	459.73	425.13	.....	459.00
169,946.93	47,400.63	217,347.56	GEORGE G. ALLEN SCHOLARSHIP FUND Established July, 1947 by gift of George G. Allen; the income to be used for scholarship aid to deserving boys and girls from Warren County, N. C., and under certain conditions, for other worthy students.	8,980.23	8,015.58	.....	4,280.00
5,947.89	1,834.57	7,782.46	ALUMNAE SCHOLARSHIP FUND Established May, 1940 by the Alumnae Association, in connection with the celebration of the Centennial of Duke University; the income to be used for scholarship aid to young women students of the Woman's College.	310.93	310.22	.....	310.00
							311.15
							12,715.81
							425.86

SCHEDULE A (Continued)—Endowment Funds

PRINCIPAL		INCOME			
Balance July 1, 1968	Additions	Balance June 30, 1969	Investment Income	Others Receipts	Balance June 30, 1969 Disbursements
2,702.01	839.19	3,541.20	141.91	.....	141.91
ALUMNI MEMORIAL SCHOLARSHIP FUND Established December, 1943 by gifts from Mr. George M. Ivey, '20 and Mr. Hunter Jones, '19 in memory of alumni of Duke University who lost their lives during World War II; the income to be used for scholarship aid to worthy students.					
542.41	152.78	695.19	25.80	.....	25.80
R. ERNEST ATKINSON SCHOLARSHIP FUND Established August, 1932 by bequest of the Reverend R. Ernest Atkinson, '17; the income to be used for scholarship aid to needy young Methodist ministers while studying at Duke University.					
8,184.21	2,542.68	10,726.89	429.94	.....	450.00
ATLANTA ALUMNI SCHOLARSHIP FUND Established May, 1941 by gifts of members of the Alumni Association of Atlanta, Ga.; the income to be used for scholarship aid to worthy students.					
87,222.77	25,287.66	112,510.43	4,280.27	.....	2,200.00
ALICE M. BALDWIN SCHOLARSHIP FUND Established June, 1945 and supplemented from time to time by gifts from students and alumnae in honor of Alice M. Baldwin, Dean of the Woman's College, 1923-47; supplemented by a gift from the Class of 1951 of the Woman's College in memory of Bernice Lipscomb, '51 and Betsy Thorup, '51; and supplemented in 1958 by a gift from the Class of 1942 of the Woman's College; to be used for scholarship aid to undergraduate students in the Woman's College.					
3,604.92	1,120.34	4,725.26	189.46	.....	189.46
BANKS-BRADSHAW SCHOLARSHIP FUND Established 1913 by gift of W. L. Banks and Mike Bradshaw, '78; the income to be used for scholarship aid to worthy students.					
13,163.77	3,426.98	16,590.75	576.16	.....	400.00
EVELYN BARNES MEMORIAL SCHOLARSHIP FUND Established in 1953 in memory of Evelyn Barnes; the income to be used for scholarship aid to worthy students in the Woman's College.					
3,671.09	1,796.08	5,467.17	219.17	.....	500.00
HERBERT J. BASS SCHOLARSHIP FUND Established 1900 by gift of Mr. and Mrs. Herbert J. Bass of Durham, N. C., in memory of their son, Herbert J. Bass, Jr.; the income to be used					
					219.17
					1,197.32
					219.17

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50,022.01	14,014.76	64,036.77	ROBERT SPENCER BELL STUDENT AID FUND Established 1912 by James A. Bell, '86, of Charlotte, N. C., in memory of his son, Robert Spencer Bell; and supplemented subsequently by additional gifts; the income to be used in providing annually a prize for one or more students evidencing the greatest improvement in his college work during the year.	16,904.11	2,369.89	2,371.42	21,645.42
7,510.57	1,418.34	8,928.91	GERMAIN BERNARD FUND Established 1959 by gift from B. C. Remedy Company and transferred in 1961 from Current Restricted Fund; the income to be used by the Duke University Medical School for scholarships, loans or research and if not used for these purposes, to be paid to the Duke University Medical Support Fund as a part of the Loyalty Fund.	239.87	239.87	239.87	239.87
5,864.07	2,030.71	7,894.78	WILLIAM M. BLACKBURN SCHOLARSHIP FUND Established 1962 by various contributions; the income to be used for scholarship aid to worthy students.	227.42	197.67	227.00	198.09
70,043.37	21,764.48	91,807.85	EDGAR S. BOWLING SCHOLARSHIP FUND Established 1928 by gift of Edgar S. Bowling, '99, in memory of his sister, Mrs. Maye Bowling Bennett, '12; the income to be used for scholarship aid, preference to be given to boys and girls from Durham and adjoining counties.	3,684.13	3,680.39	3,684.00	3,680.52
17,273.97	3,447.42	20,721.39	FRANKLIN BROWN FAMILY SCHOLARSHIP FUND Established 1954 by gift from Mr. W. Franklin Brown, '37, and Mrs. Louise Jones Brown, '38; the income to be used for scholarship aid to worthy undergraduate students.	584.13	582.95	584.00	583.08
18,728.15	5,516.82	24,244.97	ROBERTA FLORENCE BRINKLEY INTERNATIONAL SCHOLARSHIP FUND Established 1956 by gifts from students of the Woman's College of Duke University; supplemented by a gift from the Class of 1959 of the Woman's College in memory of Barbara Werner; the income to be used for scholarship aid to worthy students from other countries studying at the Woman's College of Duke University, the income currently is added to principal.	691.26	691.26	691.26	691.26
9,784.53	3,008.12	12,792.65	ELIZABETH CROWELL CARNES FOUNDATION SCHOLARSHIP FUND Established January, 1948 by bequest of Elizabeth Crowell Carnes, in memory of her parents, Jonas William Crowell and Virginia Vick Crowell; the income to be used for scholarship aid for young men and women of Duke University.	509.25	508.69	509.00	508.94

SCHEDULE A (Continued)—Endowment Funds

PRINCIPAL		INCOME			
Balance July 1, 1968	Additions	Balance June 30, 1969	Investment Income	Others Receipts	Disbursements June 30, 1969
3,518.13	1,093.83	4,611.96	184.97	184.97	184.97
CENTENNIAL SCHOLARSHIP FUND Established 1939 by gifts from several donors in connection with the Centennial celebration of Duke University; the income to be used for scholarship aid to worthy students.					
8,452.28	1,721.49	10,173.77	286.23	286.23	286.23
ROBERT L. CHAMBERS MEMORIAL SCHOLARSHIP FUND Established 1965 by various contributors in memory of Robert L. Chambers, former head trainer and track coach at Duke University; the income to be used for scholarship aid to deserving and aspiring Duke University track team members.					
14,816.48	4,582.37	19,398.85	774.96	774.96	774.96
CHRISTIAN EDUCATION SCHOLARSHIP FUND Established by various contributions designated for scholarships in the Christian Education Movement, and includes contributions from Julian S. Carr, Mrs. Annie A. Foushee, C. T. Johnson, H. E. Myers, the Pegram Family, W. P. Suggs, E. T. White, Mr. and Mrs. J. C. Braswell and Mrs. R. C. Bruton, in memory of Alexander Walker, the alumni of Harnett County, and others; the income to be used for scholarship aid to worthy students.					
297.30	74.31	371.61	12.60	12.60	147.27
CLARK CLASSICAL PRIZE FUND Established 1956 by bequest from David Taggart Clark; the income to be used for the award of an annual prize for Greek or Latin declaration or recitation.					
4,639.49	4,639.49	4,639.49	129.77	129.77	129.77
JAMES L. CLARK MEMORIAL FUND Established 1965 by a gift from Mr. and Mrs. Marvin D. Clark and supplemented by gifts from various donors in memory of James Ligon Clark; 20% of the annual income to be added to the principal and the remainder to be used for financial assistance of needy medical students at the Duke University School of Medicine.					
2,164.67	672.86	2,837.53	113.71	113.71	113.71
CLASS OF 1906 SCHOLARSHIP FUND Established July, 1937 by gifts from several members of the Class of 1906; the income to be used for scholarship aid to worthy students.					
934.41	192.62	1,127.03	32.55	32.55	65.55
CLASS OF 1910 SCHOLARSHIP FUND Established June 5, 1960 by several members of the Class of 1910; the income to be used for scholarship aid to worthy students.					
		33.24			.24

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1,405.13	437.68	1,842.81	CLASS OF 1912 SCHOLARSHIP FUND Established by gifts from several members of the Class of 1912; the income to be used for scholarship aid to worthy students.	73.95	73.95
6,833.13	2,100.00	8,933.13	CLASS OF 1914 SCHOLARSHIP FUND Established December, 1938 during the Centennial celebration of Duke University by various members of the Class; the income to be used for scholarship aid to worthy students, preference to be shown to descendants of the members of the Class of 1914.	355.08	355.08
8,385.90	2,268.90	10,654.80	CLASS OF 1917 SCHOLARSHIP FUND Established July, 1944 by gifts from Mr. and Mrs. S. C. Bunn and supplemented by gifts from several members of the Class of 1917; the income to be used for scholarship aid to worthy students.	359.55	359.55
834.27	258.97	1,093.24	CLASS OF 1918 SCHOLARSHIP FUND Established by gifts from several members of the Class of 1918; the income to be used for scholarship aid to worthy students.	43.83	43.83
19,431.71	5,854.07	25,285.78	THE CLELAND SCHOLARSHIP FUND Established 1963 by gifts of James T. and Alice Mead Cleland; the income to be used for scholarship aid to a designated senior Divinity student.	662.01	477.62
29,136.79	15,393.59	44,530.38	E. M. COLE FOUNDATION FUND Established 1920 by E. M. Cole, Charlotte, N. C.; the income to be used for scholarships for the benefit of students preparing for the ministry.	1,682.53	7,654.89
7,143.58	1,352.80	8,496.38	C. T. COUNCIL FUND Established 1959 by a gift from the B. C. Remedy Company and transferred from Current Restricted Fund in 1961; the income to be used by the Duke University Medical School for scholarships, loans or research, and if not used for these purposes, to be paid to Duke University Medical Support Fund as a part of the Loyalty Fund.	228.77	228.77
18,918.31	6,353.98	25,272.29	ROBERT B. COX SCHOLARSHIP FUND Established 1949 by gift of Robert L. Wolf, '50, and supplemented from time to time by other gifts; the income to be added to principal.	754.43	754.43
20,852.14	6,479.31	27,331.45	WILL L. CUNNINGHAM SCHOLARSHIP FUND Established 1934 by bequest of Mrs. W. L. Cunningham, and supplemented by bequest of Mrs. Albert Bourne, in memory of Reverend Will L. Cunningham, '77; the income to be used for scholarship aid, preference being given to graduates of the Methodist Orphanage, Raleigh, N. C.	1,095.69	1,105.46
				1,105.00	1,096.15

SCHEDULE A (Continued)—Endowment Funds

PRINCIPAL			INCOME			
Balance July 1, 1968	Additions	Balance June 30, 1969	Balance July 1, 1968	Investment Income	Others Receipts	Disbursements June 30, 1969
2,635.92	808.14	3,444.06	783.17	136.66	—	794.83
JULIA DALE MEMORIAL FUND Contributions by friends and relatives in memory of Miss Julia Dale; the income to be used to provide annually for the Julia Dale Prize in Mathematics.						
555.93	172.35	728.28	29.17	29.11	—	58.11
ROSE M. DAVIS SCHOLARSHIP FUND Established 1941 by Dr. Rose M. Davis, '16; the income to be used for scholarship aid.						
2,919.94	907.68	3,827.62	154.11	153.46	—	307.46
JERE R. DOWNING SCHOLARSHIP FUND Established 1936 by Mrs. Alice M. Downing and her son, J. Robert Downing, '35, as a memorial to their husband and father, Jere R. Downing of Kennebunk, Me.; the income to be given for scholarship aid, preference to be given to students from New England.						
1,912,928.36	(140,984.81)	1,771,943.55	120,747.42	82,961.58	3,356.65	60,488.36
JAMES B. DUKE 100TH ANNIVERSARY FUND Established in 1956 by gift from The Duke Endowment in recognition and commemoration of the one hundredth anniversary of the birth of James B. Duke; for the purpose of attracting and/or developing outstanding scholars in and through the Graduate School of Arts and Sciences at Duke University.						
SARAH P. DUKE BEQUEST TO THE B. N. DUKE ENDOWMENT Established 1939 by bequest from Mrs. Sarah Pearson Duke; one-half of the net income to be used for the general purposes of the University; and one-half of the net income to be used for the establishment of the B. N. Duke Scholarships.						
9,264.29	2,331.50	11,595.79	33,717.71	33,778.46	—	33,717.00
DUKE PI TAU SIGMA AWARD FUND Established 1956 by gift from the Duke Pi Iota Chapter of Pi Tau Sigma; the income to be used for an annual award to the mechanical engineering senior student who has presented the most outstanding paper in class work or in professional society competition.						
N. EDWARD EDGERTON SCHOLARSHIP IN RELIGION FUND Established May, 1940 by gift of N. Edward Edgerton, '21, of Raleigh, N. C.; to be used only for scholarship aid to candidates for the B. D.						
16,569.81	5,148.40	21,718.21	1,479.81	327.77	100.00	50.00
						1,857.58
						870.67

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22,064.50	6,180.21	28,244.71	N. E. EDGERTON SCHOLARSHIP FUND Established in January, 1953 by N. E. Edgerton, '21, through the Duke University Development Campaign; the income to be used for scholarship aid to worthy students, preference to be given to students from Wake County, North Carolina.			1,045.13	1,045.13
431.62	209.76	641.38	ENGINEERING SCHOLARSHIP FUND Established by gifts of various persons; to be used for scholarship aid to engineering students.	22.93	23.20	22.00	24.13
12,317.11	3,229.80	15,546.91	WILLIAM P. FEW MEMORIAL SCHOLARSHIP FUND Established 1942 by gifts from various persons and supplemented from time to time by other gifts; to be used for scholarship aid to worthy students.	984.19		984.19	
3,983.73	1,237.82	5,221.55	ANNE FLEXNER MEMORIAL FUND Established October, 1947 by Dr. Morris Flexner and Mrs. Marion W. Flexner, in memory of their daughter, Anne Flexner, '45; the income to be used for an annual award to the student who does the most outstanding piece of creative writing.	892.91	209.27	225.00	877.18
2,780.57	864.04	3,644.61	ARTHUR ELLIS FLOWERS SCHOLARSHIP FUND Established 1901 by Col. and Mrs. George W. Flowers, in memory of their son, Arthur Ellis Flowers; the income to be used for scholarship aid to worthy students.	146.11		146.11	
97,959.20	19,607.06	117,566.26	FRED FLOWERS SCHOLARSHIP FUND Established 1961 by bequest of Mr. Fred Flowers, '08; the income to be used for scholarship aid for worthy students.	3,317.71	3,315.56	3,317.00	3,316.27
13,901.25	4,319.19	18,220.44	GEORGE W. FLOWERS SCHOLARSHIP FUND Established June, 1927 by Claude M. Flowers, '09, in memory of his father, Col. Geo. W. Flowers, for many years a Trustee of Trinity College; the income to be used for scholarship aid to needy and worthy students.	730.41		730.41	
142,547.09	44,269.81	186,816.90	R. L. FLOWERS TRUST SCHOLARSHIP FUND Established 1948 by bequest of Lily Parish Flowers; the income to be used for scholarship aid for worthy students.	7,491.40	7,486.04	7,491.00	7,486.44
618.19	121.28	739.47	SARA CLARKSON FOWLER SCHOLARSHIP FUND Established 1963 by gift from Henry B. Fowler, in memory of Sara Clarkson Fowler; the income to be used for scholarship aid to worthy students.	20.80	20.40	40.40	.80

Established 1939 by Dr. George T. Hargitt; the proceeds to be used for establishing a research fellowship in Zoology, to be named in memory of Charles W. Hargitt.

119,839.66	49,217.16	169,056.82	J. WELCH HARRISS SCHOLARSHIP FUND Established May 23, 1950 by gift of J. Welch Harriss, '27, and supplemented subsequently by additional gifts; the income eventually to be used for scholarships to deserving young men from High Point, N. C., entering the Freshman Class. Income is presently added to principal.				4,968.04	4,968.04	
7,047.36	2,469.62	9,516.98	B. D. HEATH SCHOLARSHIP FUND Established 1903 by B. D. Heath; to be used for scholarship aid to worthy students from Union County, N. C.					366.84	500.00
		(140.44)							726.40
13,780.31	4,281.22	18,061.53	HIGH POINT SCHOLARSHIP FUND Established by gifts of members of the High Point Alumni Association in connection with the celebration of the Centennial of Duke University; the income to be used for scholarship aid for students who are graduates of the High Point, N. C., High School.				724.49	723.95	
								724.00	724.44
14,118.84	3,397.14	17,515.98	HOLCOMB SCHOLARSHIP FUND Established 1956 by gift from Dent Z. and Helen Holcomb; income to be used for scholarship aid to worthy students.				576.55	574.40	
									574.95
2,566.95	2,137.17	4,704.12	WINFRED QUINTON HOLTON MEMORIAL FUND Established 1922 by gifts of Holland Holton, '07, and Mrs. Lela Young Holton, '07, in memory of their son, Winfred Quinton Holton; the income to be used to provide a prize for investigative work in primary education.				2,971.49	177.77	
								1,085.88	2,063.38
22,206.23	22,206.23	22,206.23	CALVIN B. HOOVER GRADUATE FELLOWSHIP FUND Established 1969 by gifts from various individuals; the income to be added to the principal of the fund through June 30, 1970 and thereafter to be used for awards to worthy students in the Department of Economics.					26.10	
									26.10
29,030.29	9,020.14	38,050.43	GEORGE M. IVEY SCHOLARSHIP FUND Established December 8, 1948 by gift of George M. Ivey, '20; the income to be used for scholarship aid for deserving students in the Divinity School.					1,525.32	
								1,525.32	

SCHEDULE A (Continued)—Endowment Funds

PRINCIPAL		INCOME			
<i>Balance July 1, 1968</i>	<i>Additions</i>	<i>Balance June 30, 1969</i>	<i>Investment Income</i>	<i>Others Receipts</i>	<i>Balance June 30, 1969</i>
2,289.46	1,015.79	3,305.25	73.92	96.13	169.13 .92
WILLIAM PATTERSON JOHNSTON SCHOLARSHIP FUND Established 1964 by gift from Mr. Kenneth Taylor, '51, other employees of Old Dominion Candles, Incorporated, and supplemented by an additional gift from Mrs. William Patterson Johnston; the income to be used for scholarship aid to worthy students.					
9,417.92	2,908.94	12,326.86	492.35	491.88	492.00 492.23
HUNTER JONES SCHOLARSHIP FUND Established December, 1947 by gift of Hunter Jones, '19, Durham, N. C.; the income therefrom to be used for scholarship aid to worthy students.					
5,250.00	5,250.00	5,250.00			
CHARLES E. JORDAN SCHOLARSHIP FUND Established 1969 by gifts from B. Everett Jordan, '18 and other members of the Jordan family; the income to be used for scholarship aid to students in the Divinity School.					
46,688.10	11,989.21	58,677.31	2,029.29	2,027.40	2,029.00 2,027.69
HENRY HARRISON JORDAN MEMORIAL SCHOLARSHIP FUND Established December, 1938 by gifts from Mrs. George Way, B. Everett Jordan, '18, H. W. Jordan, Charles E. Jordan, '23, Mrs. H. C. Sprinkle, Jr., '24, and Frank B. Jordan, '27, in memory of their father, Reverend Henry Harrison Jordan, a member of the Western North Carolina Conference, and supplemented subsequently by additional gifts; the income to be used for scholarship aid to worthy students.					
2,780.57	864.04	3,644.61	3,024.40	146.11	3,170.51
J. M. JUDD SCHOLARSHIP FUND Established 1922 by Dr. J. M. Judd, '95, of Varina, N. C., with directions that the earnings be allowed to accumulate until such time as they are sufficient to provide a four-year tuition scholarship.					
245,371.79	73,362.86	318,734.65	34,186.38	12,426.24	17,122.70 29,489.92
GURNEY HARRISS KEARNS FOUNDATION FOR GRADUATE STUDY IN RELIGION FUND Established 1935 by gifts of Mr. and Mrs. Gurney Harriess Kearns, '97, High Point, N. C., supplemented by Amos R. Kearns, '27, and Charles L. Kearns, '32, and Katherine Kearns Cheek; the income to be used to promote advanced graduate study and research in religion primarily through the award of fellowships, but also to secure visiting lecturers and seminar leaders, and to award grants-in-aid to publish the more significant					

26,373.69	1,376.96	33,952.03	LEWIS CLARENCE KERNER SCHOLARSHIP IN RELIGION FUND Established in May, 1959 by gift of Mrs. Beatrice Kerner Reavis in memory of her brother, Lewis Clarence Kerner; the income to be used for scholarship aid to worship students of the Divinity School.	1,388.51	1,743.01	3,131.52
2,813.53	873.65	3,687.18	FRANK S. LAMBETH SCHOLARSHIP FUND Established 1950 by bequest of Col. Frank S. Lambeth, '80; the income to be used for scholarship aid to worthy students of Duke University.	147.76	147.76	
	45,722.06	45,722.06	JOHN HADEN LANE MEMORIAL SCHOLARSHIP FUND Established 1968 by gifts from Mr. E. H. Lane, Jr. in memory of Dr. John H. Lane; the income to be used for the aid of worthy students in the Divinity School of Duke University.	502.59		502.59
	8,125.00	8,125.00	DR. JOHN HADEN LANE MEMORIAL MEDICAL SCHOLARSHIP FUND Established 1968 by a gift from Edward H. Lane Foundation in memory of Dr. John Haden Lane; the income to be used for aid to needy medical students at Duke University School of Medicine.	61.24	500.00	561.24
13,505.02	4,196.93	17,701.95	LAURINBURG CHRISTIAN EDUCATION SCHOLARSHIP FUND Established December 11, 1948 by gift through the Methodist College Advance Fund; the income to be used for scholarship aid for worthy students of the Divinity School.	709.70	709.70	
41,959.50	9,850.16	51,809.66	WILLIAM S. LEE MEMORIAL SCHOLARSHIP FUND Established 1957 by gift from Mrs. W. S. Lee in memory of her late husband; the income to be used for scholarship aid for undergraduates in the Woman's College at Duke University.	1,665.73	1,666.00	1,666.54
2,096.23	410.94	2,507.17	WILLIAM A. LEGGETT SCHOLARSHIP FUND Established in 1961 by gift of Leggett Memorial Fund; the income to be used for Nursing School scholarships. If not used for this purpose, income to be transferred annually to the Duke University Loyalty Fund.	69.46	69.46	
53,536.05	16,635.28	70,171.33	D. M. LITAKER SCHOLARSHIP FUND Established 1946 by gift of Charles H. Litaker, '28, in memory of his father, Dr. D. M. Litaker, '90, who for 47 years was an active minister in the Methodist Church, and supplemented subsequently by additional gifts; the income and under certain conditions, a part of the corpus of the fund to be used for scholarship aid for undergraduate students, natives of the territory now embraced by the Western North Carolina Conference who are preparing for the ministry.	2,813.03	1,397.19	33,892.64

SCHEDULE A (Continued)—Endowment Funds

PRINCIPAL			INCOME			
Balance July 1, 1968	Additions	Balance June 30, 1969	Balance July 1, 1968	Investment Income	Others Receipts	Balance June 30, 1969
13,969.52	4,340.28	18,309.80	734.99	734.00	—	734.99
MARY ELIZABETH DUKE LYON SCHOLARSHIP FUND Established 1942 by Mrs. Mary Washington Staggs in memory of her mother, Mary Elizabeth Duke Lyon; the income to be used for scholarship aid for worthy students.						
278,205.10	86,445.09	364,650.19	15,327.50	14,618.05	—	15,327.50
THE McALISTER SCHOLARSHIP FUND Established December, 1935 by Mrs. Amelie McAlister Upshur in memory of her mother, Armatine Reynaud McAlister, and father William Henry McAlister; the income to be used annually for a scholarship for one boy and one girl from each of the three states of North Carolina, South Carolina and Louisiana.						
13,265.30	3,915.77	17,181.07	654.76	665.25	—	654.00
J. H. McCracken Memorial Scholarship Fund Established 1947 by Dr. J. H. McCracken, '22, and contributions from members of the First Methodist Church of Henderson, N. C., in memory of Reverend J. H. McCracken, '92, for many years a member of the North Carolina Con- ference; income to be used for scholarship aid.						
13,316.32	4,137.86	17,454.18	700.11	699.65	—	700.00
T. W. McCracken Scholarship Fund Established 1945 by Thomas W. McCracken, '15; the income to be used for scholarship aid for worthy students.						
3,604.93	1,120.34	4,725.27	189.66	189.46	—	189.00
THE O. G. B. McMULLAN SCHOLARSHIP FUND Established 1913 by gift of O. G. B. McMullan of Elizabeth City, N. C.; the income to be used for scholarship aid for worthy students, preference to be given to residents of Perquimans and Pasquotank Counties, N. C.						
19,345.37	7,503.00	26,848.37	—	696.51	—	696.51
TED MANN, JR. MEMORIAL SCHOLARSHIP FUND Established 1964 by various contributors in memory of Ted Mann, Jr., '65; the income to be used for scholarship aid to athletes on the various intercollegiate athletic teams at Duke University.						
6,331.85	1,671.92	8,003.77	283.18	282.77	—	283.00
THE LOUISE AND C. K. MASSEY SCHOLARSHIP FUND Established 1933 by gift from C. Knox Massey and supplemented subsequently by additional gifts;						
						282.95

Established 1939, in connection with the Centennial celebration of Duke University, by gift of R. A. Mayer, '96, in memory of his father, Minor C. Mayer, and mother, Sarah R. Mayer, and supplemented subsequently by additional gifts; the income to be used for scholarship aid for worthy students, preference to be given to students from Mecklenburg County, N. C.

38,927.61	38,768.65	77,696.26	METHODIST COLLEGE ADVANCE FUND	31,767.63	3,114.69	22,497.85	12,384.47
			Established by contributions from the Western North Carolina Conference and the North Carolina Conference of the Methodist Church; the income to be used for scholarships for young men and women preparing for full time service in the work of religious education, and for a program of educational service to ministers already in the field. This plan would permit the use of the funds for special conferences, expansion of the Ministers' Loan Library, short-term winter courses, and other services, particularly to rural churches.				
416.73	129.19	545.92	ALBERT MILMOW PRIZE IN ELECTRICAL ENGINEERING	280.27	21.90	5.00	297.17
			Established 1935 by gift of Albert Milmow; the income to be used in providing annually a prize to that student from North or South Carolina graduating in the Department of Electrical Engineering who, in the opinion of the faculty of that department, has made the most progress in electrical engineering during his last year in college. This prize consists of a certificate of award and one year's dues in the American Institute of Electrical Engineers.				
2,931.00	487.80	3,418.80	FANNIE MITCHELL ENDOWMENT FUND	4.34	93.96	93.96	4.34
			Established 1968 by gifts from various individuals and companies in honor of Miss Mitchell and in recognition of her dedication to Duke University; the income to be used for scholarship aid to worthy students.				
3,335.65	1,036.02	4,371.67	W. H. MOORE SCHOLARSHIP FUND		175.21	175.21	
			Established 1920 in memory of Dr. W. H. Moore, '71, by his wife, Mrs. W. H. Moore, and daughters, Mrs. W. E. Steele, Miss Maude Moore, Mrs. T. L. Parsons, Mrs. J. H. Ihre, and Mrs. J. LeGrand Everett; the income to be used for scholarship aid to worthy students.				
92,486.45	27,889.86	120,376.31	THOMAS R. MULLEN, JR. SCHOLARSHIP FUND	2,330.11	4,716.22	2,320.00	4,716.33
			Established April 5, 1949 by a gift of T. R. Mullen in memory of his son and supplemented subsequently by additional gifts; the income to be used for scholarship aid for worthy young men and women.				

SCHEDULE A (Continued)—Endowment Funds

PRINCIPAL			INCOME					
Balance July 1, 1968	Additions	Balance June 30, 1969		Balance July 1, 1968	Investment Income	Others Receipts	Disbursements	Balance June 30, 1969
24,002.40	7,436.45	31,438.85	MYERS PARK SCHOLARSHIP FUND Established 1948 by contributions of the members of the congregation of the Myers Park Methodist Church, Charlotte, N. C.; the income to be used for the benefit of the Divinity School.		1,257.55		1,257.55	
24,870.77	7,268.83	32,139.60	GEORGE E. NORMAN, JR. SCHOLARSHIP FUND Established 1963 by gift of George E. Norman, Jr. in memory of the deceased members of his family and supplemented by the Burlington Industries Foundation; the income to be used to assist worthy and deserving young men enrolled in the Department of Religion in the Graduate School of Arts and Sciences or in the graduate department of the Divinity School, who are preparing to enter the Christian ministry as pastors, teachers or foreign missionaries.	1,797.23	858.06		500.04	2,155.25
3,604.93	1,120.34	4,725.27	J. A. ODELL SCHOLARSHIP FUND Established 1897 by gift of James A. Odell; the income to be used for scholarship aid to worthy students.		189.46		189.46	
3,604.93	1,120.34	4,725.27	J. M. ODELL SCHOLARSHIP FUND Established 1897 by gift of Captain J. M. Odell; the income to be used for scholarship aid to worthy students.		189.46		189.46	
26,814.25	8,107.69	34,921.94	W. R. ODELL SCHOLARSHIP FUND Established 1940 by gifts from Fred C. Odell, '02, Mrs. Ralph M. Odell, Arthur G. Odell, '06, and supplemented from time to time by others, in memory of William R. Odell, '75, for more than 50 years a member of the Board of Trustees of Duke University; the income to be used for scholarship aid for worthy students.		1,370.96		1,370.96	
16,251.40	5,049.47	21,300.87	THE W. R. ODELL DIVINITY SCHOLARSHIP FUND Established June 1946 by members and friends of the Forest Hills Methodist Church, Concord, N. C., in memory of William R. Odell, '75; the income to be used for scholarship aid for students		853.87		853.87	

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2,860.30	5,635.26	36,141.10	HENRY A. PAGE SCHOLARSHIP FUND Established January 1942 by gift of Henry A. Page, Jr., '07, and Gertrude Wetherill Page, in memory of his father, Henry A. Page, for many years a member of the Board of Trustees of Duke University; the income to be used for scholarship aid to worthy students, preferably those preparing for the study of medicine.	1,463.00	1,460.82	1,463.26	1,461.08
2,780.57	864.04	3,644.61	EDWARD JAMES PARRISH SCHOLARSHIP FUND Established 1921 by Mrs. Rosa Brown Parrish, in memory of her husband, Edward J. Parrish, '67; the income to be used for scholarship aid to worthy students.	146.11	146.11		
40,587.05	7,783.49	48,370.54	PHYSICAL MEDICINE SCHOLARSHIP FUND Established 1963 by gift from Central Carolina Convalescent Hospital, Inc., Greensboro, N. C.; the income to be used for scholarship aid to medical students and/or post graduate fellows in physical medicine and rehabilitation at Duke University.	1,342.89	1,046.41		2,389.30
62,492.96		62,492.96	THE MARSHALL L. AND SARAH W. PICKENS SCHOLARSHIP FUND Established 1968 by gifts from Mrs. Mary G. Pickens; the income to be used to provide one or more scholarships in the Graduate School of Hospital Administration at Duke University.	546.05			546.05
34,722.21	34,722.21	34,722.21	ROBERT H. PINNIX SCHOLARSHIP FUND Established 1968 by gift from Mr. Robert H. Pinnix, '24, the income to be used for scholarship aid to worthy students in the School of Engineering.				
142,650.00	(142,650.00)		MARTHA GARNER PRICE RESEARCH FELLOWSHIP FUND Established 1964 by gift from the Ralph Price family in memory of Mrs. Martha Garner Price; the income to be used for a research fellowship in the World Rule of Law Center of Duke University.	5,367.90		5,367.90	
2,987.61	731.10	3,718.71	THE JAMES B. RAST MEMORIAL FUND Established December 1957 by Mr. and Mrs. W. B. Rast, in memory of their son, James Brailford Rast, '58; the income to be used for an annual award to the student who demonstrates the greatest achievement in the study of Comparative Anatomy.	123.61	791.23		766.34
675,219.02	204,393.71	879,612.73	W. N. REYNOLDS MEMORIAL SCHOLARSHIP FUND Established 1961 by transfer from the W. N. Reynolds Loan Fund; the income to provide scholarships, to be awarded in the following order of preference, children of employees of R. J. Reynolds Tobacco Company, children of residents of Forsyth County, and residents of or natives of North Carolina.	34,563.31	34,587.13	34,212.00	34,998.44

SCHEDULE A (Continued)—Endowment Funds

PRINCIPAL			INCOME			
Balance July 1, 1968	Additions	Balance June 30, 1969	Balance July 1, 1968	Investment Income	Others Receipts	Disbursements
3,335.65	1,036.03	4,371.68		175.21	175.21	
JOHN T. RING SCHOLARSHIP FUND Established 1919 by gift of S. G. Ring and family of Kernersville, N. C., in memory of John T. Ring, '16, who was killed in France during World War I; the income to be used for scholarship aid for worthy students.						
13,281.64	4,127.18	17,408.82	698.83	697.85		276.00
T. V. ROCHELLE SCHOLARSHIP FUND Established 1945 by T. V. Rochelle, '14, High Point, N. C.; the income to be used for scholarship aid for a worthy and needy student who is a graduate of the High Point, N. C., High School.						
27,100.65	5,579.99	32,680.64	1,541.35	943.57		800.00
GILBERT T. ROWE MEMORIAL SCHOLARSHIP FUND Established 1960 and supplemented from time to time by gifts from friends and alumni in memory of Professor Gilbert T. Rowe, '93, and by combining in 1963 the Winston-Salem District of Western N. C. Conference Loan Fund; the income to be used for scholarship aid to senior students of the Divinity School.						
13,445.85	4,178.53	17,624.38		706.56		706.56
ELBERT RUSSELL DIVINITY SCHOOL SCHOLARSHIP FUND Established 1943 and supplemented from time to time by gifts from friends and alumni of the Divinity School, in honor of Elbert Russell, Dean and Professor of Biblical Interpretation of the Divinity School, 1926-1945; the income to be used for scholarship aid for students preparing for the ministry in the Divinity School.						
2,358.23	601.59	2,959.82		88.39		88.39
SANDALS SCHOLARSHIP FUND Established 1955 by contribution from Sandals, for the purpose of eventually providing scholarship awards to rising sophomores in the Woman's College of Duke University. Presently income is added to principal.						
12,129.33	2,871.41	15,000.74	763.83	485.59		763.00
ALEX H. SANDS, JR. SCHOLARSHIP FUND Established 1956 by gifts from Alex. H. Sands, Jr.; to be used for scholarship aid to worthy students.						
7,435.82	1,417.62	8,853.44	251.30	255.56		166.09
HASKEL SCHIFF MEMORIAL FUND Established 1967 by gifts from various individuals; the income to be used for an annual award to an outstanding intern, resident or fellow in the Department of Medicine at Duke Hospital.						
						486.42
						340.77

MARIAN SANFORD SEALY SCHOLARSHIP FUND
Established April, 1966 by transfer from the Marian Sanford Sealy loan fund; the income to be added to principal until it reaches \$5,000 then to be used at the discretion of the Dean of Duke University School of Nursing and a committee appointed by the dean to honor a student enrolled in the Duke University School of Nursing who is worthy of scholarship aid.

3,097.33 944.79 4,042.12 1,077.40 156.00 1,233.40

WILLIAM SENHAUSER MEMORIAL FUND
Established 1947 by gift of Mrs. Thomas E. Raymond in memory of her son. An award is made annually to the sophomore or junior who has made the greatest contribution through participation and leadership in intramural sports.

32,664.90 9,781.50 42,446.40 3,571.00 1,654.03 1,654.61

JOSEPH H. SEPAK MEMORIAL SCHOLARSHIP FUND
Established 1950 by gifts from friends in memory of Joseph H. Separk, '96, for many years a member of the Board of Trustees of Duke University; the income to be used for scholarship aid to worthy students, preference to be given to students from Gaston County, N. C.

12,364.91 2,576.07 14,940.98 1,028.44 435.64 1,064.08

THE GEORGE SHERRER, III MEMORIAL AWARD IN ELECTRICAL ENGINEERING
Established 1938 by gift from Mr. and Mrs. S. Donald Sherrerd, in memory of their son, George Sherrerd, III, '55; the income to be used for an annual award to the senior in Electrical Engineering who has attained the highest level of scholastic achievement in all subjects and simultaneously has rendered significant service to the College of Engineering and the University at large.

22,004.36 6,838.10 28,842.46 1,157.89 1,156.29 1,157.18

J. RAYMOND SMITH SCHOLARSHIP FUND
Established 1939 by J. Raymond Smith, '17, Mr. Airy, N. C., in connection with the Centennial Celebration of Duke University; the income to be used for scholarship aid to worthy students.

103,945.94 29,529.21 133,475.15 4,997.13 4,993.44 4,993.57

WILLIS SMITH SCHOLARSHIP FUND
Established 1939 by Willis Smith, '10, and supplemented from time to time by other gifts; the funds to be used for scholarship purposes.

13,290.68 4,129.52 17,420.20 698.30 698.30

HERSEY EVERETT SPENCE SCHOLARSHIP FUND
Established December, 1947 by gifts of members of the Methodist Church of Sanford, N. C., through the Methodist College Advance Fund, in honor of Hersey Everett Spence, '07, former pastor of that church and a member of the faculty of the Divinity School of Duke University; the income to be used for scholarship aid to deserving students in the Divinity School.

FINANCIAL REPORT

FINANCIAL REPORT

18,264.22	10,047.71	29,311.93	THE WAGGONER SCHOLARSHIP FUND Established 1954 by contribution from T. R. Waggoner, '22, and supplemented subsequently by additional gifts in memory of his parents, Thomas Spencer Waggoner and Eva Barnwell Waggoner; the income to be used for scholarship aid for worthy undergraduate students.		352.22	665.36	352.00	665.58
3,604.93	1,120.34	4,725.27	GEORGE W. WATTS SCHOLARSHIP FUND Established 1897 by gift of George W. Watts; the income to be used for scholarship aid to worthy students.		189.46	189.46	189.46	189.46
3,604.93	1,120.34	4,725.27	C. E. WEATHERBY SCHOLARSHIP FUND Established 1912 by C. E. Weatherby, Faison, N. C.; the income to be used for scholarship aid to worthy students.		189.46	189.46	189.46	189.46
3,961.32	898.25	4,859.57	WEST CAMPUS CHEST SCHOLARSHIP FUND Established 1954 by the male undergraduate students of Duke University and supplemented annually for the purpose of providing scholarship awards to male students in residence in one of the undergraduate colleges.		152.96	151.96	152.00	152.92
184,523.54	38,401.40	222,924.94	THE HILLORY M. WILDER SCHOLARSHIP FUND Established 1962 by bequest from Celeste W. Blake and Kenneth M. Blake, in memory of Dr. Hillory M. Wilder; the income to be used for scholarship aid to capable, earnest young men and women of the white race and protestant faith who are residents of North Carolina and in need of financial assistance in the pursuit of study of the medical profession.		6,830.41	6,493.71	6,715.50	6,608.62
24,307.75	6,330.36	30,638.11	FLORENCE K. WILSON SCHOLARSHIP FUND Established 1955 by contribution from students of the School of Nursing, and by combining in 1961 the Duke Nurses Alumnae Association Scholarship and supplemented by gifts from the Wilson family and friends; the income to be used for scholarships for students in the School of Nursing. If the income from the fund is not used for scholarship purposes for the School of Nursing it may be transferred to the Loyalty Fund.		877.01	856.28	877.00	906.29

Established 1896 by Reverend J. A. Cunningham,
'90; to be loaned to young men preparing for
the ministry.

8,340.05 2,591.34 10,931.39 D. B. HEATH LOAN FUND
Established 1921 by B. D. Heath of Charlotte,
N. C.; income to be used for students preparing
for the ministry, preference to be given to one
student annually from Union County, N. C.

13,505.21 4,196.11 17,701.32 HOLMES-McCAUSLAND LOAN FUND
Established 1946 by gifts of Alfred M. McCausland
and Frances Holmes McCausland, '26, in memory
of their parents; the principal or income to be
used for loans to students in the Divinity School.

4,935.44 1,519.98 6,455.42 HOLLAND HOLTON MEMORIAL LOAN FUND
Established March, 1918 by friends and former
students in memory of Holland Holton, '07,
Professor of Education and Director of the Sum-
mer School of Duke University for many years;
to be used in helping worthy young men and
women in securing a college education.

271.56 59.07 330.63 MARSHA PAULK MEMORIAL LOAN FUND
Established 1958 by gifts from the students of the
Duke University School of Physical Therapy and
friends of Marsha Paulk; to be used for loans to
full-time students enrolled in the School of
Physical Therapy.

7,085.01 1,716.00 8,801.01 HENRY SIMPSON PROCTOR LOAN FUND
Established 1957 by gift from Mrs. A. M. Proctor,
Mrs. Alberta Proctor Hyde, Mrs. Julia Proctor
Makosky and Hugh W. Proctor, in memory of
Arthur Marcus Proctor, '10; the income to be
used for aid to graduate students in the
Department of Education.

1,662.61 399.52 2,062.13 HENRY CARSON WEST LOAN FUND
Established 1934 by gift from H. Carson West,
'17, and supplemented subsequently by additional
gifts; to provide loans for upper-classmen from
North Carolina.

73,795.68 23,394.17 97,189.85

6,373,535.88 1,295,318.04 7,668,853.92

64,679,127.98 4,189,564.43 68,868,692.41

Total Available for Student Aid

GRAND TOTALS

FINANCIAL REPORT

10,357.09	438.18	10,795.27
10,310.52	709.56	11,058.04
3,366.81	257.09	3,638.90
1,431.54	10.05	1,459.35
3,035.57	290.27	3,340.35
644.01	68.00	712.01
73,094.43	3,775.81	1,068.63
599,460.26	330,674.24	8,780.89
1,294,193.10	3,195,120.54	142,414.55
		3,194,385.33
		1,437,342.86

Schedule A (Continued)—Endowment Funds

NOTES

Certain Endowed Funds established for the benefit of Duke University have independent trustees. The following information is furnished by the trustees:

BOOK VALUE

Income Restricted for Student Aid:**MARY ALYSE SMITH SCHOLARSHIP FUND**

Established December, 1946 by Alyse Smith, '30, of Burlington, North Carolina, now Mrs. Wilbur Cooper, and her father, M. B. Smith (deceased 1952), with Central Carolina Bank & Trust Company as Trustee: supplemented in 1947, 1948, 1957 and 1958 by Alyse Smith. Income to be used for scholarship aid to worthy North Carolina boys and girls entering the freshman class. Book Value April 1, 1969 (Market Value \$91,215.93)

\$ 25,267.76

Income Restricted for Other than Student Aid:**THE DURHAM FOUNDATION: ALYSE SMITH COOPER FUND FOR DUKE UNIVERSITY**

Established December 31, 1964 by Alyse Smith, now Mrs. Wilbur N. Cooper, class 1930, of Burlington, North Carolina with Central Carolina Bank & Trust Company as Trustee. Principal and accumulated income earmarked for construction equipment and support of music and musical education portions of future Arts Center.

Book Value April 1, 1969 (Market Value \$29,316.48)

\$ 27,678.98

JAMES A. GRAY TRUST

The James A. Gray Trust was created December 21, 1946, with the Wachovia Bank and Trust Company as Trustee. The official name is, "The Winston-Salem Foundation." Under the terms of the agreement, Duke University will receive 2/35ths of the income for use "in operating and maintaining its educational services in behalf of North Carolina churches and pastors, particularly, rural churches and pastors." According to the statement furnished by the Trustee, the book value of the trust at November 30, 1968 was

\$4,662,923.70

FREDERIC M. HANES BEQUEST

Wachovia Bank and Trust Company, Winston-Salem, North Carolina, Trustee of trust created under Will of Frederic M. Hanes for the benefit of the Unit of Duke University known as the Duke University Medical School and Hospital.

Book Value at the close of the Trust Year on May 8, 1969.

\$3,476,185.00

FREDERIC M. HANES MEMORIAL TRUST

Wachovia Bank and Trust Company, Winston-Salem, N. C. Trustee under agreement with Elizabeth P. Hanes for Frederic M. Hanes Memorial Trust of Duke University Medical School.

Book Value at the close of the Trust Year on June 1, 1969.

\$ 99,045.33

Income Restricted for Student Loans:**ALBERT ANDERSON BEQUEST**

Wachovia Bank and Trust Company, Raleigh, North Carolina, Trustee of trust created under Will of Albert Anderson for use as a Loan Fund to Methodist Students attending Duke University.

Book Value at the close of the Trust Year on June 1, 1969.

\$ 29,742.50

SCHEDULE B—STUDENT LOAN FUNDS

PRINCIPAL AND INCOME AVAILABLE FOR LOANS:	BOOK VALUE
ALOE CHARITABLE TRUST LOAN FUND FOR STUDENTS IN HOSPITAL ADMINISTRATION	
Established 1962 by gift of Aloe-Medical Division of Brunswick Corporation; to be used for loans to students in the graduate courses in hospital administration at Duke University.	\$ 12,414.67
ALUMNI LOAN FUND	
Established 1915 by gift from the Alumni Association.	2,602.92
ALBERT ANDERSON LOAN FUND	
Established in 1952 by accumulation of the income from the bequest of Albert Anderson, '83, for current use in aiding and assisting in the education of worthy and deserving young men and women of the Methodist faith.	37,095.37
BYNUM BELOTE LOAN FUND	
Established 1924 by E. T. Belote of Asheville, N. C., in memory of his son, Alfred Bynum Belote, student, 1923-24.	8,181.12
A. D. BETTS LOAN FUND	
Established 1919 by Reverend G. W. Vick, '11, and wife, in memory of Reverend A. D. Betts, a member of the North Carolina Conference; other contributions by Reverend W. A. Betts and Mrs. L. P. Wilkins; to be used for the aid of young men preparing for the ministry.	4,775.35
CHRISTIAN EDUCATION LOAN FUND	
Established 1921 as a part of the Christian Education movement of the Methodist Church in North Carolina; for use as a general loan fund.	4,136.58
CLASS OF 1902 LOAN FUND	
Established 1932 by the members of the class at their 30th Anniversary Reunion.	1,833.80
NELLIE B. DOSHER LOAN FUND	
Established 1966 by gift of Dr. William S. Doshier in memory of his mother Mrs. Nellie Galloway Doshier; to be used for loans to Divinity School students.	1,687.58
J. B. DUKE CHURCH EXTENSION LOAN FUND	
Established 1925 by gift from James B. Duke; to be used for the aid of young men preparing for the ministry.	9,503.59

Schedule B (Continued)—Student Loan Funds

	BOOK VALUE
ALEXANDER EDENS MEMORIAL LOAN FUND	
Established 1920 by Lacy T. Edens, '24, Cora R. Edens, John A. Edens, L. D. Edens, '15, and L. F. Edens, in memory of Alexander Edens.	\$ 8,048.18
SCHOOL OF FORESTRY LOAN FUND	
Established 1940 by gifts of various persons; to be used for the aid of students in the School of Forestry.	2,692.35
GENERAL LOAN FUND	
Established 1900 by the North Carolina Conference and supplemented from time to time by additional contributions by both the North Carolina Conference and the Western North Carolina Conference; to be used for no other purpose than to aid worthy students of the University	144,929.76
WILLIAM H. GLASSON LOAN FUND	
Established 1966 by bequest from Dr. William H. Glasson; to be used for loans to assist graduate students in economics and political science in the publication of meritorious words of research.	12,825.68
W. O. GOODE EDUCATIONAL LOAN FUND	
Established 1923 by Reverend W. O. Goode of the Western North Carolina Conference.	3,198.33
MARY HESTER HAMBRICK LOAN FUND	
Established 1925 by W. R. Hambrick, Haldah Satterfield, John Jackson Hambrick, '16, and Dr. Robert T. Hambrick, '19, in memory of Mary Hester Hambrick, wife and mother; loans to be made to any needy students, preferably from Person County, N. C.	4,718.63
F. M. HANES GRADUATE MEDICAL LOAN FUND	
Established in December, 1952, by transfer from the Current Restricted "F. M. Hanes Bequest to the School of Medicine Fund;" to be used for loans to post-graduate medical students.	199,938.78
P. FRANK HANES LOAN FUND	
Established 1934 by P. Frank Hanes, '11; administered by a Loan Fund Committee of the Law School; loans to needy and deserving law students.	4,447.84
SEABORN L. HARDMAN LOAN FUND	
Established 1966 by gift from Mrs. S. L. Hardman, Sr., in memory of Seaborn Lanier Hardman, Jr.; to be used for short term loans to medical students.	1,000.00

Schedule B (Continued)—Student Loan Funds

	BOOK VALUE
HEALTH PROFESSIONS STUDENT LOAN FUND	
Authorized by Part C. of the Health Professions Educational Assistance Act of 1963; loans to medical students qualifying under provisions of the Act.	\$ 458,295.56
HEALTH PROFESSIONS STUDENT LOAN REVOLVING FUND	
Authorized by Part C of the Health Professions Educational Assistance Act of 1963, as amended; loans to medical students qualifying under provisions of the Act.	242,975.64
J. B. IVEY LOAN FUND	
Established 1922 by J. B. Ivey of Charlotte, N. C.; to be used for loans to worthy students.	6,323.77
W. K. KELLOGG FOUNDATION LOAN FUND FOR MEDICAL STUDENTS	
Established 1943 by gift of the W. K. Kellogg Foundation; to be used for loans to medical students.	21,180.33
W. K. KELLOGG FOUNDATION LOAN FUND FOR MEDICAL TECHNOLOGY	
Established 1953 by gift of the W. K. Kellogg Foundation; to be used for loans to students in the field of medical technology.	2,073.73
W. K. KELLOGG FOUNDATION LOAN FUND FOR NURSES	
Established 1942 by gift of the W. K. Kellogg Foundation; to be used for loans to students in the School of Nursing.	3,561.42
W. K. KELLOGG FOUNDATION LOAN FUND FOR PHYSICAL THERAPY	
Established 1943 by gift of the W. K. Kellogg Foundation; to be used for loans to students receiving training in physical therapy.	4,738.35
W. K. KELLOGG FOUNDATION LOAN FUND FOR STUDENTS IN HOSPITAL ADMINISTRATION	
Established 1962 by gift from W. K. Kellogg Foundation; to be used for loans to graduate students in hospital administration at Duke University.	15,569.87
MASONIC LOAN FUND	
Established 1923 by the North Carolina Masonic Educational Loan Fund Committee; to be used for aid to worthy students.	857.71
MEDICAL FRESHMAN TUITION LOAN FUND	
Established August 28, 1960 by gift from Dr. George W. Brumley, Jr., '56, and Mrs. Jean Stanback Brumley, '58; to be loaned to freshmen in the School of Medicine.	9,685.60

Schedule B (Continued)—Student Loan Funds

	BOOK VALUE
MEDICAL POST-GRADUATE LOAN FUND	
Established in August, 1954 by transfer from Current Restricted "F. M. Hanes Bequest to the Department of Medicine Fund;" to be used for loans to post-graduate students in medicine.	\$ 107,139.96
MEDICAL STUDENTS LOAN FUND	
Established 1941 by gifts of various persons.	916.56
GEORGE W. MERCK MEMORIAL LOAN FUND	
Established 1963 by gift from the Merck Company Foundation; to be used for loans to post-graduate students in the Duke University School of Medicine.	19,558.10
MINISTERIAL EDUCATION LOAN FUND	
Established 1915 by the North Carolina Conference of the Methodist Church; to be used for loans to students preparing for the ministry.	7,813.05
NATIONAL DEFENSE STUDENT LOAN FUND	
Established under Title II of the National Defense Education Act of 1958; loans to students qualifying under provisions of the Act.	2,645,532.34
WILLIAM NEAL STUDENT AID FUND	
Established 1920 by John W. Neal in memory of his son, William Neal, student in 1919; to be used for loans to worthy and needy students.	7,613.33
NORTON LOAN FUND	
Established by various donors at Highland Hospital; loans of an emergency nature to employees at Highland Hospital.	2,228.42
NORTH CAROLINA CONFERENCE BOARD OF CHRISTIAN EDUCATION LOAN FUND	
Established 1931 by gift of the Board of Christian Education of the North Carolina Conference; to be used for loans to students preparing for the ministry or other distinctive type of Christian service.	14,545.40
NURSING STUDENT LOAN FUND	
Authorized by Part B of the Nurse Training Act of 1964; loans to nursing students qualifying under provisions of the Act.	40,024.25

Schedule B (Continued)—Student Loan Funds

	BOOK VALUE
NURSING STUDENT LOAN REVOLVING FUND	
Authorized by Part B of the Nurse Training Act of 1964, as amended; loans to nursing students qualifying under provisions of the Act.	\$ 29,750.00
PSYCHIATRY LOAN FUND	
Established 1956 by transfer from Psychiatry Department Operating Fund; to be used for loans to post-graduate students in Psycho-analysis.	17,099.10
W. N. REYNOLDS LOAN FUND	
Established by W. N. Reynolds, '86, of Winston-Salem, N. C.; to be used for loans to boys and girls of North Carolina seeking an education at Duke University; preference, however to be given to the children of employees of the R. J. Reynolds Tobacco Company, regardless of residence.	177,686.53
ROANOKE RAPIDS HIGH SCHOOL LOAN FUND	
Established 1925 by the graduating class of the Roanoke Rapids High School, Roanoke Rapids, N. C.; to be used for loans to students who are graduates of that school.	1,318.49
JESSE O. SANDERSON LOAN FUND	
Established 1967 by gift from the North Carolina Education Association, Raleigh Unit, in memory of Jesse O. Sanderson; to be used for loans to worthy students.	357.45
SCOTT LOAN FUND	
Established in October, 1952 by I. M. Scott, '32, and supplemented subsequently by additional gifts; to be used for loans to medical students.	6,016.38
THE COLONEL HAMILTON FOLTS SEARIGHT LOAN FUND	
Established 1957 by gift from Mrs. Louise Searight Morell, '42; to be used for the aid of students pursuing a science curriculum.	557.09
JOSEPH F. STEIN STUDENT LOAN FUND	
Established 1961 by gifts of Mr. Joseph F. Stein to the Duke University School of Nursing; to be used for loans to students in the School of Nursing.	4,271.88
SURGICAL POST-GRADUATE LOAN FUND	
Established 1954 by transfer from the Department of Surgery Fund; to be used for loans to post-graduate students in surgery.	5,454.01

Schedule B (Continued)—Student Loan Funds

	BOOK VALUE
FRANCIS AND ELIZABETH SWETT STUDENT LOAN FUND	
Established 1967; to be used for short term emergency loans to medical students.	\$ 4,730.17
ELLA WESCOTT TUTTLE LOAN FUND	
Established 1923 by Reverend D. H. Tuttle, '80, in memory of his wife, Ella Wescott Tuttle; to be used for loans to worthy young women seeking an education at Duke University.	7,558.33
JOSHUA VICK MEMORIAL LOAN FUND	
Established 1920 by Mrs. J. W. Vick in memory of her husband, Joshua Vick; to be used for loans to needy students.	3,354.00
WAKE COUNTY ALUMNAE LOAN FUND	
Established 1924 by the Raleigh Chapter of the Alumnae Association; to be used for loans to worthy women students.	6,144.19
LUCY T. WOOLARD MEDICAL LOAN FUND	
Established 1962 in memory of Lucy T. Woolard by her daughters, Wylma, Rachel, and Margaret Woolard and Thelma Soloway; the principal and income to be used for loans to interns and residents in the Duke University Medical Center whose interests include the study of diseases of the blood.	2,506.67
MARY POAGE WOOTEN LOAN FUND	
Established 1922 by Reverend John C. Wooten, '98, in memory of his wife, Mary Poage Wooten; to be used for loans to worthy students.	3,937.91
	<u>4,345,406.12</u>
ENDOWMENT FUNDS INCOME AVAILABLE FOR LOANS:	
See Schedule A—for Details	76,127.47
TOTAL	<u><u>\$4,421,533.59</u></u>

SCHEDULE G—GIFTS AND GRANTS FOR INSTRUCTION AND DEPARTMENTAL RESEARCH

American Heart Association	\$ 4,000.00
Arthritis Foundation	500.00
Beckman Instruments, Inc.	20,100.00
The Mary Duke Biddle Foundation	49,625.00
Burlington Industries, Inc.	202,500.00
Celanese Corporation	2,500.00
Central Carolina Bank & Trust Company	540.83
Commonwealth Fund	5,000.00
W. Horace Corbett	47,500.00
The Duke Endowment	120,000.00
Enka Foundation	10,000.00
Thomas A. Finch Foundation	50,000.00
William W. Flexner	2,000.00
The Ford Foundation	30,377.00
Ford Motor Company Fund	100,000.00
General Motors Corporation	10,000.00
International Business Machines Corporation	25,000.00
Richard K. Mellon Charitable Trust	200,000.00
Merck & Company, Inc.	500.00
Peninsular Life Insurance Company	2,500.00
C. W. Perry	7,400.00
Dudley A. Rauch	893.54
The Rockefeller Foundation	64,282.00
William Rorer, Inc.	5,000.00
Shell Companies Foundations, Inc.	10,000.00
Smith, Kline & French Laboratories	600.00
Wachovia Bank & Trust Company	24,589.29
Womens' College Alumnae Association	2,500.00
Others	19,858.79
Total	<u>\$ 1,017,766.45</u>

SCHEDULE C—GIFTS AND GRANTS FOR RESEARCH

Abbott Laboratories	\$ 1,500.00
Louis & Bessie Adler Foundation, Inc.	1,000.00
American Bar Foundation	2,836.67
American Cancer Society	184,006.45
American Chemical Society	11,100.00
American Cyanamid Company	1,410.00
American Diabetes Association	4,150.00
American Heart Association	86,168.15
American Hoechst Corporation	9,750.00
American Medical Association	89,861.51
American Optical Company	2,000.00
American Tobacco Company	22,000.00
Astra Pharmaceutical Products	1,250.00
Ayerst Laboratories	23,100.00
Barrus Construction Company	5,000.00
Beckman Instruments, Inc.	15,000.00
The Mary Duke Biddle Foundation	29,500.00
Bird Corporation	3,000.00
Burlington Industries Foundation	2,020.00
Burroughs Wellcome Company	26,500.00
Cameron Athletic Corporation	3,000.00

Schedule C (Continued)—Gifts and Grants for Research

The Canada Council	\$ 1,324.00
Cancer Research Association	11,000.00
Ciba Corporation	11,500.00
Dome Labs	9,000.00
Duke Hospital Auxiliary	43,550.00
Duke Laboratory Foundation	500.00
E. I. Dupont de Nemours & Company	17,500.00
Easter Seal Research Foundation	(1,429.17)
Education in World Arts	3,114.00
Epilepsy Foundation	9,500.00
Ovidio D. Escalante	500.00
Florida Medical Association	500.00
The Ford Foundation	59,668.05
Herman Frasch Foundation	10,000.00
F. M. Hanes Memorial Trust	6,007.70
John A. Hartford Foundation, Inc.	2,450.00
Henderson County Cancer Society	2,000.00
Marcus E. Hobbs	1,250.00
Hoffman LaRoche Foundation	2,300.00
Institute for International Order	1,000.00
Johnson & Johnson	7,108.00
Walter Kempner Foundation	69,792.50
Fred W. Klein	2,000.00
Lederle Laboratories	1,250.00
Life Insurance Medical Research Fund	15,400.00
Eli Lilly & Company	22,900.00
Josiah Macy, Jr. Foundation	30,000.00
Laurena K. Marshall	6,218.88
Mead Johnson & Company	12,500.00
Melpar, Inc.	644.00
Lucia Mercer	2,034.32
Merck & Company	7,755.00
Muscular Dystrophy Association of America, Inc.	8,000.00
National Academy of Sciences	992.37
National Aeronautics & Space Administration	191,809.01
National Cystic Fibrosis Research Foundation	28,170.00
National Foundation	30,189.00
National Multiple Sclerosis Society	25,062.27
National Science Foundation	2,345,121.09
National Tuberculosis & Respiratory Assn.	10,186.50
NEN Biomedical Assay Laboratories	3,000.00
North Carolina Heart Association, Inc.	51,000.00
North Carolina State University	6,550.00
North Carolina Tuberculosis & Respiratory Assn.	28,875.00
Ohio State University	565.75
Ortho Pharmaceutical Corporation	5,000.00
Parke Davis & Company	2,980.00
Mary Morton Parsons	5,000.00
Mrs. Stanton W. Pickens	1,000.00
Physical Research Foundation	11,900.00
John Renzulli	700.00
Research for Prevention of Blindness	5,000.00
Research Triangle Institute	6,815.99
Riker Laboratories	4,500.00
A. H. Robbins Company, Inc.	4,374.00
Walter G. Robins	49,937.50
William H. Ruffin	2,000.00
Russell Sage Foundation	12,691.35
G. D. Searle & Company	7,500.00

Schedule C (Continued)—Gifts and Grants for Research

J. Kelly Sisk	\$ 500.00
Southern Forest Institute	4,376.59
Southern Pulpwood Conservation Association	5,400.00
Eugene A. Stead, Jr.	500.00
Travenol Laboratories, Inc.	881.79
Treasurer of North Carolina	34,184.95
Treasurer of United States	10,620.04
United Health Foundation, Inc.	2,500.00
United Health Services of N. C., Inc.	8,000.00
United Medical Research Foundation	19,900.00
University of California	2,400.00
University of North Carolina	60,324.00
Upjohn Company	14,350.00
United States Air Force	150,372.33
United States Army	4,181,066.96
United States Atomic Energy Commission	1,362,082.48
United States Department of Agriculture	16,552.77
United States Department of Interior	37,484.79
United States Department of Labor	17,016.69
United States Navy	171,184.17
United States Office of Education	52,534.00
United States Public Health Service	9,219,201.94
Vocational Rehabilitation Administration	13,190.68
B. B. Walker Shoe Foundation	500.00
Warner-Lambert Pharmaceutical Company	4,000.00
George Washington University	(1,647.13)
Winthrop Laboratories	6,880.00
Others	10,603.04
Total Gifts and Grants	\$ 19,146,869.98

Less allocation to current unrestricted fund
for indirect expense recovery on sponsored
research and training activities and
contract services

	2,856,955.28
Total	<u>16,289,914.70</u>

SCHEDULE D—GIFTS AND GRANTS FOR TRAINING PROGRAMS

American Cyanamid Company	\$ 4,000.00
American Society for Heating, Refrigeration and A/C Engineers	4,835.00
The Mary Duke Biddle Foundation	15,550.00
Board of Education—The United Methodist Church	9,500.00
Carnegie Foundation	29,700.00
Center for Continuing Medical Education	7,000.00
Ciba Corporation	1,000.00
Commonwealth Fund	30,780.00
Council on Legal Education	19,500.00
R. N. Crenshaw	500.00
Danforth Foundation	168,820.00
Joseph M. Dave Foundation	5,850.00
The Duke Endowment	144,500.00
Florida Conference—The United Methodist Church	600.00

Schedule D (Continued)—Gifts and Grants for Training Programs

The Ford Foundation	\$ 817,414.92
Foreign Policy Association	1,904.21
James A. Gray Trust	15,049.41
F. M. Hanes Bequest	168,572.99
Hercules, Inc.	2,599.25
Hoffman-LaRoche, Inc.	1,500.00
Holston Annual Conference—The United Methodist Church	2,150.00
International Union of Biochemistry	500.00
W. K. Kellogg Foundation	74,299.00
The Learning Institute of North Carolina	8,292.20
Josiah Macy, Jr. Foundation	15,000.00
S. E. Massengill Company	4,000.00
The Menninger Foundation	1,000.00
Merck & Company, Inc.	1,500.00
Monsanto Company	3,000.00
National Association for Retarded Children	12,600.00
National Foundation for Medical Education	15,750.00
National Fund for Medical Education	5,250.00
National Science Foundation	219,844.88
North Carolina Conference—The United Methodist Church	5,650.00
North Carolina Society for Crippled Children	600.00
North Carolina State Board of Health	36,708.13
North Carolina State University	(4,993.40)
Operation Breakthrough	13,171.13
Organon, Inc.	500.00
Person County Chapter— National Foundation of Infantile Paralysis	750.00
Price Waterhouse Foundation	5,800.00
G. D. Searle & Company	9,090.00
Shell Companies Foundation, Inc.	40,000.00
Social Studies Conference	524.30
South Carolina Conference—The United Methodist Church	600.00
Southeastern Jurisdictional Conference—The United Methodist Church	6,761.59
Southern Bell Telephone & Telegraph Company	2,269.00
Southern Regional Educational Board	14,498.41
State of Florida	2,500.00
Anne C. Stauffer Foundation	27,274.80
Trane Company	1,050.00
Treasurer of North Carolina	44,978.32
Treasurer of United States	1,680.00
United States Office of Education	3,943.44
United States Public Health Service	3,666,448.42
Veterans Administration	16,200.00
Virginia Conference—The United Methodist Church	3,900.00
West Virginia Conference—The United Methodist Church	3,110.45
Western North Carolina Conference—The United Methodist Church	6,450.00
Winthrop Laboratories	500.00

Schedule D (Continued)—Gifts and Grants for Training Programs

Wyeth Laboratories	\$ 1,000.00
Others	5,957.38
	5,729,283.83
Total gifts to training programs	
Less allocation to current general fund	
for indirect expense recovery on	
sponsored research and training	
activities and contract services	352,905.65
Total	<u>\$ 5,376,378.18</u>

SCHEDULE E—GIFTS AND GRANTS FOR
SPECIAL PROGRAMS

American Chemical Society	\$ 630.00
American Medical Association	600.00
American Society for Public Administration	1,000.00
Anonymous	5,000.00
Norman Archambault Estate	13,270.00
Charles Ballenger	5,000.00
The Mary Duke Biddle Foundation	44,650.00
John J. Bilitz	500.00
Carl Bimel	500.00
J. O. Blackburn	1,210.25
Board of Education—The United Methodist Church	116,327.25
Mrs. C. G. Bookhout	1,000.00
R. R. Bowker Company	10,000.00
S. H. Camp & Company	1,285.26
Samuel Higby Camp Foundation	1,500.00
Carnegie Corporation	40,000.00
N. B. Carter	500.00
Charles S. Clegg	5,131.25
R. Taylor Cole	750.00
Commonwealth Fund	115,000.00
Paul H. Cook	1,000.00
Alex Copeland, Jr.	2,450.40
A. M. Covington	1,000.00
Harry L. Dalton	10,000.00
William F. Danehower	565.00
Danville Memorial Hospital	1,200.00
Danville Orthopaedic Clinic	11,466.00
J. L. Davis	6,346.53
W. C. Davison	3,000.00
Raymond J. Duffey	500.00
Angier Biddle Duke	750.00
The Duke Endowment	97,000.00
Duke Hospital Auxiliary	1,500.00
Duke University Religious Council	1,365.16
Durham County Board of Education	17,433.18
Educational Facilities Laboratory	30,000.00
Ernst & Ernst Foundation	500.00
Esso Education Foundation	55,000.00
The Ford Foundation	22,820.00
Sandra Forrester	500.00
Graduate Nursing Fund	1,526.54
W. L. Gunter	7,000.00
P. Huber Hanes Bequest	25,000.00

Schedule E (Continued)—Gifts and Grants for Special Programs

Nancy Hanks	\$ 1,569.75
Joseph S. Hiatt, Jr.	1,000.00
Julius N. Hicks	1,350.38
Luther Hodges	557.50
Harold C. Holland	1,000.00
William Hollister	1,008.75
S. F. Horne	650.00
Ives Laboratories, Inc.	6,510.00
Jefferson Standard Life Insurance Company	8,586.70
W. K. Kellogg Foundation	51,665.00
Frances E. Kelly, Jr.	1,000.00
The Kendall Company Foundation	1,000.00
The Ada Howe Kent Foundation	1,000.00
R. Paul Kropp	500.00
Law Alumni Fund	3,686.50
W. P. Lewis	1,000.00
Lorillard Corporation	20,000.00
Louisiana State University, School of Medicine	(4,950.97)
S. E. Massengill Company	2,500.00
Donald E. McCollum	500.00
John P. McGovern	1,000.00
Medical Alumni Association	1,500.00
Irving Melnick	500.00
Merck & Company Foundation	12,500.00
Robert Moeller	500.00
Julia and Earl Mueller	600.00
Esther Nathan	500.00
National Science Foundation	(73,581.59)
Nixon Portrait Committee	3,115.40
Grizzelle M. Norfleet	1,000.00
North Carolina Conference—The United Methodist Church	31,670.04
Old Dominion Foundation	10,000.00
Orientation American Law	6,000.00
Robert L. Patterson	4,000.00
Henry B. Perry II	500.00
Pilot Life Insurance Company	6,666.67
William Reid Pitts	6,085.78
T. E. Powell III	1,000.00
N. Joe Rahall	6,000.00
Regional Educational Laboratory	8,700.41
Rockefeller Family	3,109.00
Carl A. Rudisill Foundation	5,000.00
Rebecca B. Rust	1,000.00
James H. Semans	1,900.00
Numa L. Smith, Jr.	1,500.00
Spindale Mills, Inc.	1,000.00
G. E. Staehle	1,000.00
Eugene A. Stead, Jr.	2,000.00
Dana Strauss	500.00
A. J. Tannebaum	1,002.40
Daniel Taylor	50,000.00
Kitty M. Taylor	1,713.60
Richard E. Thigpen	8,651.25
A. S. Thomas Memorial Fund, Inc.	500.00
Treasurer of North Carolina	12,127.11
Treasurer of United States	6,686.00
Trustees Holmstead Foundation	1,398.59

Schedule E (Continued)—Gifts and Grants for Special Programs

United States Office of Economic Opportunity	\$ 113,275.00
United States Office of Education	154,221.84
United States Public Health Service	1,514,983.87
University of North Carolina	82,300.00
Upjohn Company	6,710.00
Veterans Administration	220,404.27
Western Carolina Tractor Company	750.00
Western North Carolina Conference—The United Methodist Church	57,690.86
Xerox Corporation	1,500.00
Yale University	2,000.00
John A. Yarborough	1,000.00
Others	59,008.23
Total gifts for special programs	3,103,099.16
Less allocation to current general fund for indirect expense recovery on sponsored research and training activities and contract services	231,898.05
	<u>\$ 2,871,201.11</u>

SCHEDULE F—GIFTS AND GRANTS FOR LIBRARIES

The Mary Duke Biddle Foundation	\$ 21,000.00
J. B. Creighton, Jr.	500.00
The Duke Endowment	100,000.00
William B. Hamilton	1,124.00
Richard P. Kratz	500.00
Martin J. Kreshon	1,041.97
National Institute of Health	30,082.56
Thomas L. Perkins	6,500.00
Estelle F. Spears	2,500.00
Others	7,314.50
Total	<u>\$ 170,563.03</u>

SCHEDULE H—GIFT FOR STUDENT SERVICES

The Mary Duke Biddle Foundation	<u>\$ 9,600.00</u>
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SCHEDULE I—GIFTS FOR CURRENT EXPENSES

Aid Association for Lutherans	\$ 500.00
Alamo National Bank	(1,000.00)
Alcoa Foundation	2,000.00
Charles Alexander	1,000.00
Mary A. Allen	1,000.00
The Allyn Foundation, Inc.	500.00
American Chemical Society	630.00
American Medical Association	2,325.35
Amon Company	600.00
Marie Anderson	5,204.75

Schedule I (Continued)—Gifts for Current Expenses

Babcock and Wilcox Company	\$ 800.00
Bank of America	500.00
Bethlehem Steel Corporation	25,000.00
Kenneth M. Brim	1,500.00
Fred P. Brooks	590.31
Pat Brown	5,050.00
Mr. and Mrs. W. C. Brown	1,668.87
G. R. Buck	500.00
Burlington Industries Foundation	1,000.00
Jack H. Campbell	1,000.00
W. H. Cartwright	1,500.00
Central Carolina Bank & Trust Company	8,000.00
The Chase Manhattan Bank Foundation	5,000.00
Milton C. Cobey	500.00
Norman A. Cocke	27,375.00
Cocos Foundation, Inc.	500.00
W. M. Courtney	3,000.00
W. Franklin Cowan	5,000.00
J. B. Craven, Jr.	1,457.94
Merrimon Cuninggim	1,000.00
G. Neil Daniels	1,991.00
David J. Deas	500.00
The Dickerson Foundation	1,000.00
O. Lawrence Dortch	1,125.00
Angier Biddle Duke Foundation	1,000.00
Nanaline H. Duke Bequest	44,042.29
Maurice J. Duttera	500.00
Mrs. J. D. Eller, Jr.	1,014.15
Nereus C. English, III	1,500.00
The Equitable Life Assurance Society of the United States	1,000.00
The T. M. Evans Foundation, Inc.	1,000.00
W. D. Farmer	1,000.00
T. A. Finch, Jr.	1,000.00
First National City Bank Foundation	2,368.00
J. A. Forlines, Jr.	2,500.00
The Ford Foundation	1,171,397.78
Ford Motor Company Fund	3,590.93
F. C. Frostick, Jr.	1,500.00
Garland Woodcraft Company	1,000.34
James E. Gibson, Jr.	3,119.36
Charles D. Gray	500.00
Paul Gross	1,000.00
Mrs. J. K. Hall	850.00
Nancy Hanks	1,456.25
Miles H. Harvey	1,710.00
H. J. Haynsworth, IV	9,075.54
Herald Sun Papers, Inc.	1,000.00
Thomas F. Hewitt Estate	10,000.00
Walter E. Hoadley	500.00
Langston Holland	736.00
Home Savings & Loan Association	1,000.00
W. Henry Hoover	7,500.00
Household Finance Foundation	700.00
Theodore P. Huggins	500.00
Alfred M. Hunt	16,036.75
Allan S. Hurlburt	1,337.22
International Nickel Company	500.00
Robert Q. Jones	500.00

Schedule I (Continued)—Gifts for Current Expenses

John Kenefick	\$ 500.00
Hobart E. Klaaren	500.00
Mrs. Milton Lachman	500.00
Mrs. J. S. Lanahan	500.00
Liggett & Myers Tobacco Company	20,000.00
J. R. Marion	500.00
R. Walker Martin	1,000.00
Claude M. May	500.00
McCormick & Company	1,000.00
C. G. McGehee, Jr.	1,000.00
Keith McGowan	923.98
W. B. McGuire	944.11
D. R. Mead & Company	1,000.00
Richard Mead, Jr.	1,000.00
Mellon National Bank & Trust Company	1,000.00
Merck & Company	500.00
Merrill Lynch, Pierce, Fenner & Smith Foundation, Inc.	1,500.00
Monsanto Fund	10,000.00
Morgan Guaranty Bank & Trust Company	600.00
Myers-Textiles Foundation, Inc.	2,000.00
National Merit Scholarship Corporation	9,625.00
New England Mutual Life Insurance Company	1,000.00
North Carolina National Bank Foundation	30,000.00
Richard A. Northam	750.00
Marvin G. Osborn, Jr.	1,144.78
P.P.G. Industries Foundation	715.00
John G. Page	1,178.25
William R. Patterson	1,495.00
William R. Perdue	4,914.73
T. L. Perkins	25,000.00
Clifford W. Perry	3,648.40
Mrs. William P. Phelps	2,055.13
Philadelphia & Reading Foundation, Inc.	5,000.00
Piedmont Aviation, Inc.	1,000.00
Frances Pierce	846.56
Edwin Polokoff	528.75
Procter & Gamble Scholarship Program	2,400.00
Quaker Oats Foundation	700.00
Jack H. Quaritius	2,000.00
H. B. Rauch	2,382.63
The Reader's Digest Association, Inc.	500.00
R. J. Reynolds Tobacco Company	5,000.00
Leon L. Rice, Jr.	1,020.00
Rockefeller Foundation	3,000.00
Rockport Fund	1,000.00
Roses Stores, Inc.	500.00
Ross Foundation of Charlotte	1,000.00
Paul W. Sanger Estate	2,985.38
Sears, Roebuck & Company Foundation	3,000.00
Arnold M. Schechter	600.00
Sol Schechter	2,000.00
C. F. Schock	1,000.00
Sea Level General and Children's Hospital, Inc.	285,689.16
Vann V. Secrest	1,000.00
Shell Companies Foundation, Inc.	10,000.00
Mark Shepherd, Jr.	2,085.00
Thomas A. Shepherd	1,000.00
Carroll C. Shoemaker	500.00

Schedule I (Continued)—Gifts for Current Expenses

Richard A. Sirois	\$ 1,500.00
Six Associates, Inc.	10,000.00
Slane Hosiery Mills, Inc.	1,000.00
William B. Somerville	1,000.00
Southern Products Foundation	1,500.00
J. Southgate & Sons, Inc.	500.00
Marshall T. Spears, Jr.	600.00
Bart N. Stephens	500.00
J. P. Stevens Company	30,000.00
J. William Strott	1,000.00
Mr. and Mrs. Allston Stubbs	602.00
Mr. and Mrs. R. P. Suman	717.50
Nello L. Teer Company	5,000.00
H. K. Terry	500.00
Texaco, Inc.	1,500.00
Bertha E. Thomas	1,000.00
Mr. and Mrs. R. Y. Thompson	855.98
Travelers, Inc.	649.00
R. A. Tripper, Jr.	1,000.00
James W. Vaughan, Jr.	600.00
Charles B. Wade, Jr.	635.77
Herman Walker	2,308.25
George E. Wallace	1,000.00
Brantley Watson	1,000.00
F. L. Welther	500.00
William W. Werber	500.00
Western Electric Company	1,450.00
Mr. and Mrs. Norm Wherrett	500.00
J. G. Whildin	700.00
Mrs. Donald L. Whitener	750.00
Dr. and Mrs. G. I. Uhde	600.00
Claude B. Williams, Jr.	500.00
L. Neil Williams	1,378.13
Wix Corporation	1,500.00
David M. Wood	631.00
Frank R. Wrenn	1,200.00
Others	88,064.97
Total	<u>\$ 2,027,727.29</u>

SCHEDULE J—GIFTS AND GRANTS FOR
FELLOWSHIPS AND SCHOLARSHIPS

ABG Industries, Inc.	\$ 1,000.00
M. W. Adelson	2,000.00
Alcoa Foundation	1,500.00
Franklin E. Altany	1,000.00
American Cancer Society	13,224.96
Austell Box Board Corporation	1,000.00
Baker, Hostetler & Patterson	500.00
The Ballenger Foundation	500.00
P. J. Baugh Industries	500.00
Henderson Belk	1,500.00
Faith Bell Trust	1,132.00
William T. Berkeley	500.00
The Mary Duke Biddle Foundation	57,000.00

Schedule J (Continued)—Gifts and Grants for Fellowships and Scholarships

W. I. Bissette	\$ 2,520.89
Black Industries	1,000.00
Blue Devil Basketball Coaches Clinic	744.77
Board of Education—The United Methodist Church	3,250.00
Fred W. Bradshaw	2,400.00
W. Franklin Brown	535.00
Franklin Brown Insurance Agency	3,520.00
Broyhill Educational Fund, Inc.	500.00
Burlington Industries, Inc.	7,700.00
Lloyd Caudle	1,000.00
Cincinnati Milling Machine Foundation	3,000.00
Cocos Foundation, Inc.	9,000.00
Collier Cobb & Associates, Inc.	1,000.00
Committee on World Service	1,000.00
Mary Alyse Smith Cooper Trust	2,000.00
Alex Copeland, Jr.	1,500.00
A. M. Covington	2,250.00
John W. Covington, Sr.	500.00
Carol Cranmer Family	1,425.00
Mrs. Dorothy K. Cranmer	2,285.00
John R. Dean Foundation	500.00
Dickson Foundation, Inc.	4,500.00
Charles Downey	500.00
Angier Duke Memorial, Inc.	250,000.00
Durham Coca-Cola Bottling Company	867.35
Eaves Insurance Agency, Inc.	500.00
Ernst & Ernst Foundation	500.00
Fiber Industries, Inc.	5,000.00
Brown F. Finch Foundation	650.00
Thomas A. Finch Foundation	2,000.00
A. E. Finley Foundation, Inc.	2,275.00
First United Methodist Church, Lexington, N. C.	1,000.00
Friends Foundation, Inc.	2,500.00
General Electric Company	500.00
Robert P. Gorrell	1,900.00
Robert Gross	500.00
Charles B. Hagan	500.00
W. C. Hamrick, Jr.	500.00
Milton E. Harrington	1,000.00
J. Welch Harriss	500.00
Harry J. Haynsworth, IV	1,523.67
H. Dermont Hedrick	2,481.25
A. Frank Hooker, Sr.	3,500.00
Huguenot Society of America	500.00
Joseph A. Hunoval	500.00
International Business Machines Corporation	3,682.00
Edwin L. Jones, Jr.	500.00
B. Everett Jordan	1,000.00
William K. Lomason	2,443.62
Edward B. Mabry	500.00
The Magee Christian Education Foundation	1,000.00
John W. Malone	500.00
The John & Mary R. Markle Foundation	42,000.00
Walker Martin Foundation	1,000.00
T. Bragg McLeod	700.00

Schedule J (Continued)—Gifts and Grants for Fellowships and Scholarships

Medical Alumni Fund	\$ 2,354.00
Robert N. Miller Memorial Fund	3,819.58
National Science Foundation	222,587.39
The Nearly New Shoppe	4,000.00
North Carolina National Bank	500.00
O'Melveny & Myers	1,000.00
Peat, Marwick, Mitchell & Co.	800.00
Charles Pfizer & Company, Inc.	1,000.00
William R. Pitts	1,110.25
H. W. Plimpton	2,114.76
Price Waterhouse Foundation	800.00
Procter & Gamble Fund	7,680.00
Henry E. Rauch	500.00
The Rockefeller Foundation	163,619.90
Sears, Roebuck Foundation	11,000.00
Seventeen Magazine	500.00
Shell Companies Foundation, Inc.	11,500.00
Roy C. Shepherd, Jr.	500.00
Slane Hosiery Mills	1,500.00
Smith, Currie & Hancock	1,000.00
Dudley Smith	2,000.00
J. Raymond Smith	2,700.00
Tarboro Concrete & Building Supplies, Inc.	500.00
Texaco, Inc.	3,300.00
Union Camp Corporation	1,200.00
Union Carbide Corporation	5,000.00
United States Department of Interior	114,710.91
United States Public Health Service	149,546.33
United States Steel Foundation, Inc.	7,800.00
Vulcan Materials Company	2,000.00
Herman Walker	2,166.50
Wallace Fisheries Company	500.00
Helen Hay Whitney Foundation	9,000.00
John A. Yarborough	1,400.00
Others	70,915.08
Total gifts and grants	\$ 1,277,135.21
Less allocation to current general fund for indirect expense recovery on sponsored research and training activities and contract services	27,048.50
Total	<u>\$ 1,250,086.71</u>

SCHEDULE K—GIFTS FOR STUDENT LOAN FUNDS

Albert Anderson Trust	\$ 2,332.59
Merck Company Foundation	1,500.00
Others	65.00
Total	<u>\$ 3,897.59</u>

SCHEDULE L—GIFTS FOR ENDOWMENT FUNDS

George V. Allen	\$ 26,331.00
Lennox D. Baker	1,005.00
M. Margaret Ball	500.00
Mrs. R. C. Berry	500.00
Thomas C. Bost	46,800.00
Olive Bridge Fund, Inc.	1,500.00
A. S. Brower Estate	1,000.00
Louise L. Brown	1,000.00
David K. E. Bruce	500.00
Burlington Industries, Inc.	1,040.00
Bayard Carter Society	215,400.26
James T. Cleland	2,050.00
Ivey Cowan	24,500.00
Frank T. deVyver	500.00
Aurelia Adams Dukes	750.00
Charles A. Dukes, Sr.	750.00
Robert F. Durden	800.00
Eleanor T. Elliott	979.91
The Ford Foundation	62,500.00
William F. Franck	14,130.00
Franklin Realty Insurance Company	2,500.00
Mark T. Frizzelle	32,580.11
Hanes Corporation Foundation	250,000.00
J. Welch Harriss	15,200.00
George Watts Hill	500.00
Mrs. Wylanta R. Holt	4,000.00
Humble Companies Trust	500.00
Margaret Johnston	500.00
Edwin L. Jones, Jr.	26,406.00
Edwin L. Jones, Sr.	92,280.00
J. A. Jones Construction Company	100,000.00
B. Everett Jordan	3,000.00
Amos R. Kearns	33,781.11
E. H. Lane, Jr.	43,350.00
Edward H. Lane Foundation	5,000.00
Minnie and Bernard Lane Foundation	3,000.00
Annabel J. Link	1,000.00
Jane G. Marrow	1,367.50
S. E. Massengill Company	7,500.00
John R. Moloney, Jr.	787.50
J. A. Morgan Estate	900.00
George E. Norman, Jr.	1,268.75
James J. O'Leary	1,200.00
Henry M. Oliver, Jr.	500.00
Marshall I. Pickens	8,800.00
Mary G. Pickens	55,688.94
Robert H. Pinnix	30,000.00
B. U. Ratchford	1,548.75
Nathan Swartz	1,000.00
Alex Shuford	1,000.00
Stone & Webster, Inc.	1,000.00
Richard E. Thigpen	500.00
W. P. Tudor	1,000.00
Wachovia Bank & Trust Company	10,000.00
Wachovia Foundation, Inc.	25,000.00
T. R. Waggoner	4,988.00
B. S. Womble	49,500.00
Calder W. Womble	4,837.56

Schedule L (Continued)—Gifts for Endowment Funds

W. F. Womble	\$ 10,231.25
John E. Woodward	2,875.00
Others	15,924.79
Total	<u>\$ 1,253,551.43</u>

SCHEDULE M—GIFTS AND GRANTS FOR PLANT FUNDS

Alcoa Foundation	\$ 125,000.00
American Cyanamid Company	20,000.00
American Telephone & Telegraph Company	25,000.00
The Mary Duke Biddle Foundation	15,000.00
Burlington Industries Foundation	62,500.00
W. C. Calton	1,000.00
The Cannon Foundation	250,000.00
Betsy M. Babcock	30,234.38
Chatham Foundation, Inc.	16,000.00
R. Taylor Cole	500.00
Cross Cotton Mills Company	1,000.00
Douglas P. Damerson, Sr.	1,000.00
The Duke Endowment	2,945,000.00
Duke Hospital Auxiliary	17,670.00
Nanaline H. Duke Bequest	205,862.62
Esso Education Foundation	15,000.00
A. E. Finley & Associates	2,250.00
A. E. Finley Foundation, Inc.	2,750.00
The Ford Foundation	60,000.00
W. K. Goodson	700.00
Bahnson Gray	1,000.00
Gulf Oil Corporation	25,000.00
J. G. Hanes	28,200.00
J. G. Hanes Memorial Fund	25,000.00
Edwin L. Jones, Jr.	6,811.00
The John and Mary R. Markle Foundation	100,000.00
National Science Foundation	1,370,401.17
M. Wilson Nesbitt	575.00
Charles Nickerson	500.00
North Carolina Conference—The United Methodist Church	1,941.50
North Carolina Medical Care Commission	491,773.05
North Carolina Products Corporation	1,000.00
North Carolina State University	88,324.00
Ortec, Inc.	1,762.71
Dudley Overby	565.00
R. C. Petry	1,200.00
Martha B. Wadsworth Rathman	1,727.00

Schedule M—Gifts and Grants for Plant Funds

Salisbury Community Foundation	\$ 7,000.00
South Carolina Conference—The United Methodist Church	7,637.75
Southeastern Jurisdictional Conference—The United Methodist Church	104,675.47
Southern Bell Telephone Company	40,000.00
Mrs. Estelle F. Spears	12,487.50
H. C. Sprinkle	900.00
Treasurer of North Carolina	32,731.75
Treasurer of United States	1,142,578.00
United States Public Health Service	1,369,786.00
Stephen A. Wainwright	47,500.00
T. Max Watson	1,000.00
Archie J. Weith	3,912.50
Marjorie M. Weith	1,000.00
John Wesley & Anna H. Hanes Foundation	25,000.00
Western North Carolina Conference—The United Methodist Church	20,000.00
Western Carolina Tractor	2,250.00
Western Electric Foundation	35,000.00
Others	32,203.59
Total	<u>\$ 8,827,909.99</u>

SCHEDULE N—GIFTS IN KIND OF CAPITAL ASSETS

Joan J. Bilitz	\$ 1,200.00
Bryan Bolich	5,000.00
Mr. and Mrs. W. H. Branson	600.00
Winston Broadfoot	520.00
Mrs. A. S. Brower	10,000.00
G. S. T. Cavanaugh	510.00
Fred Chappell	1,500.00
Robert Childress	3,000.00
Paul Clyde	650.00
Mrs. C. C. Cox	750.00
John Curtiss	730.00
C. Shelby Dale	5,000.00
Harry Dalton	3,000.00
W. C. Davison	8,200.00
G. C. Daughters	1,000.00
F. T. DeVyver	2,230.00
W. D. Forbus	43,000.00
W. B. Hamilton	1,312.40
O. S. Hansen	500.00
E. S. Harrar	1,187.50
Deryl Hart Family	1,250.00
Phillip Jamison	800.00
Amos R. Kearns	3,152.56

Schedule N (Continued)—Gifts in Kind of Capital Assets

Douglas M. Knight	\$ 4,500.00
Weston LaBarre	6,896.10
Doris Leeper	700.00
Ruth G. Newman	17,302.00
Knut Schmidt-Neilsen	1,315.00
Mrs. H. J. Oosting	6,355.00
Dudley Overby	565.00
Peninsular Life Insurance Company	50,000.00
Sea Level General and Children's Hospital, Inc.	1,939,096.80
Mary D. B. T. Semans	78,461.50
W. C. Styron	1,750.00
Wright Tisdale	4,034.54
W. H. Willis	700.00
Mr. and Mrs. Robert Yeager	3,720.00
Arter, Inc.	1,762.71
Calbiochem.	30,000.00
Cameron Athletic Corporation	18,000.00
Devilbiss Company	890.00
Dow Chemical Company	924.35
Dunham Bush, Inc.	500.00
Electronic Assistance	1,750.00
Hewlett Packard Company	6,354.75
Jefferson Standard Broadcasting Company	23,750.00
Texas Instruments, Inc.	13,374.00
Westinghouse Electric Corporation	21,222.39
Other Donors	16,101.99
Total	<u><u>\$2,345,118.59</u></u>

DUKE UNIVERSITY INVESTMENTS

Fiscal Year Ended June 30, 1969

<i>Bonds</i>	<i>U. S. Treasury</i>
<i>Par Value</i>	
11M	5% Notes 11-15-70
1M	2½% Bonds 12-15-64/69
10M	4% Bonds 8-15-70
6M	2½% Bonds 3-15-66/71
310M	4% Bonds 2-15-72
999.5M	3% Bonds 2-15-95
1M	3½% Bonds 11-15-98

U. S. Government Instrumentalities

775M	Banks for Cooperatives 6.60% Deb. 8-4-69
30M	Banks for Cooperatives 6.90% Deb. 12-1-69
5M	Federal Home Loan Banks 6⅞% Notes 8-25-69
40M	Federal Intermediate Credit Banks 6.05% Deb. 9-2-69
110M	Federal Intermediate Credit Banks 6.35% Deb. 10-1-69
590M	Federal Intermediate Credit Banks 6.60% Deb. 11-3-69
85M	Federal Farm Loan Consolidated 6¼% Bonds 9-22-69
100M	Federal Farm Loan Consolidated 6.20% Bonds 4-20-70
70M	Federal Land Banks 5¾% Bonds 1-20-70
50M	Federal Land Banks 3½% Bonds 5-1-71
100M	Federal Land Banks 4½% Bonds 2-20-74
1,000M	Federal Land Banks 5⅞% Bonds 4-20-78
175M	Federal Land Banks 5% Bonds 1-22-79
280M	Federal National Mortgage Association 4⅞% Deb. 9-10-70
1,000M	Federal National Mortgage Association Participating Certificates 5.45% Due 4-1-77
1,000M	Federal National Mortgage Association Participating Certificates 5.35% Due 4-1-79
1,000M	Federal National Mortgage Association Participating Certificates 5.40% Due 6-23-79
	Other
112M	Alabama Power Co. 4⅞% Mtge. 5-1-83
50M	Alabama Power Co. 3⅞% Mtge. 3-1-84
75M	Alabama Power Co. 3½% Mtge. 6-1-85
50M	Alabama Power Co. 4⅞% Mtge. 5-1-87
50M	Alabama Power Co. 3⅞% Mtge. 1-1-88
125M	Alabama Power Co. 4⅞% Mtge. 5-1-89
200M	Allied Chemical Corp. 3½% Deb. 4-1-78
50M	Aluminum Co. of America 3⅞% Deb. 4-1-83
50M	American Can Co. 4¾% Deb. 7-15-90
50M	American Telephone & Telegraph Co. 2¾% Deb. 2-1-71
70M	American Telephone & Telegraph Co. 3¼% Deb. 9-15-84
200M	American Telephone & Telegraph Co. 4⅞% Deb. 4-1-85
480M	American Telephone & Telegraph Co. 3⅞% Deb. 7-1-90
200M	American Telephone & Telegraph Co. 4⅞% Deb. 5-1-99
50M	Appalachian Electric Power Co. 3½% Mtge. 12-1-83
100M	Appalachian Electric Power Co. 4⅞% Mtge. 3-1-87
50M	Arkansas Power & Light Co. 4⅞% Mtge. 2-1-93
98M	Armco Steel Corp. 4.35% Deb. 4-1-84
50M	Armco Steel Corp. 4½% Deb. 6-1-86
70M	The Atlantic Refining Co. 3¼% Deb. 1-15-79
200M	Automatic Canteen Co. of America 4¾% Conv. Deb. 7-1-81
.25M	Baptist Building 6% First Mtge. 4-1-77

Duke University Investments—(Continued)

*Bonds
Par Value*

.25M	Baptist Building 6% First Mtge. 5-1-83
50M	Becton, Dickinson & Co. 4½% Conv. Deb. 6-1-88
50M	Bell Telephone Co. Pennsylvania 4¾% Deb. 2-1-2003
200M	Black & Decker Manufacturing Company 4% Conv. Sub. Deb. 4-1-92
50M	Boston Edison Co. 4¾% Mtge. 6-1-87
100M	C.I.T. Financial Corp. 6¼% Notes 7-15-69
800M	C.I.T. Financial Corp. 8¾% Notes 7-24-69
288M	C.I.T. Financial Corp. 7¼% Notes 10-15-69
40M	C.I.T. Financial Corp. 3¾% Deb. 9-1-70
100M	C.I.T. Financial Corp. 4¾% Deb. 1-1-79
130M	C.I.T. Financial Corp. 5½% Deb. 1-15-80
65M	C.I.T. Financial Corp. 4½% Deb. 9-1-84
125M	Carolina Power & Light Co. 3½% Mtge. 10-1-82
100M	Carolina Power & Light Co. 4½% Mtge. 11-1-91
1,000M	Carolina Power & Light Co. 5½% Mtge. 4-1-96
50M	Central Illinois Light Co. 4¾% Mtge. 7-1-87
100M	Central Illinois Light Co. 4¾% Mtge. 3-1-90
50M	Central Illinois Public Service Co. 3¾% Mtge. 9-1-77
200M	Central Illinois Public Service Co. 4¾% Mtge. 1-1-89
100M	Central Power & Light Co. 4¾% Mtge. 4-1-89
50M	The Champion Paper Company 3¾% Deb. 7-15-81
50M	The Chesapeake & Potomac Telephone Co. 4¾% Deb. 2-1-98
50M	Cincinnati Gas & Electric Co. 4¾% Mtge. 5-1-87
2M	City of Durham Parking Facility, Revenue 3¼% Bond 4-1-96
50M	Columbus & Southern Ohio Electric Co. 3¾% Mtge. 4-1-86
375M	Commercial Credit Co. 6¾% Notes 7-18-69
1,255M	Commercial Credit Co. 7¾% Note 12-15-69
20M	Commercial Credit Co. 3¾% Notes 2-1-76
50M	Commercial Credit Co. 5% Notes 6-1-77
70M	Commercial Credit Co. 4¾% Notes 11-1-80
50M	Commonwealth Edison Co. 4¼% Mtge. 3-1-87
96M	Commonwealth Edison Co. 4¾% Deb. 1-1-2009
75M	Consolidated Edison Co. of N. Y., Inc. 3½% Mtge. 2-1-83
75M	Consolidated Edison Co. of N. Y., Inc. 3¾% Mtge. 1-1-84
350M	Consolidated Edison Co. of N. Y., Inc. 3¾% Mtge. 5-1-86
100M	Consolidated Edison Co. of N. Y., Inc. 4¼% Mtge. 10-1-86
50M	Consolidated Edison Co. of N. Y., Inc. 5% Mtge. 10-1-87
100M	Consolidated Edison Co. of N. Y., Inc. 4¾% Mtge. 11-1-91
200M	Consolidated Edison Co. of N. Y., Inc. 4¾% Mtge. 10-1-92
43M	Consolidated Natural Gas Co. 4¾% Deb. 6-1-82
38M	Consolidated Natural Gas Co. 5% Deb. 9-1-82
100M	Consolidated Natural Gas Co. 4¾% Deb. 2-1-86
100M	Consolidated Natural Gas Co. 4¾% Deb. 5-1-86
50M	Consolidated Natural Gas Co. 4¾% Deb. 4-1-88
50M	Consumers Power Co. 4% Mtge. 8-1-86
50M	Consumers Power Co. 4½% Mtge. 10-1-88
100M	Consumers Power Co. 3¼% Mtge. 2-1-90
45M	Delaware Power and Light Co. 3¾% Mtge. 6-1-88
50M	The Detroit Edison Co. 3¼% Mtge. 5-15-80
100M	Diamond State Telephone Co. 4¾% Deb. 4-1-94
794M	Disney (Walt) Productions, Inc. 4½% Conv. Deb. 1-15-93
200M	Duke Power Co. 3% Mtge. 1-1-75
500M	Duke Power Co. 2.65% Mtge. 9-1-77
323M	Duke Power Co. 4¾% Deb. 9-1-82

Duke University Investments—(Continued)

*Bonds
Par Value*

100M	Duke Power Co. 3½% Mtge. 5-1-86
600M	Duke Power Co. 4¼% Mtge. 8-1-92
50M	Duquesne Light Co. 3⅝% Mtge. 9-1-83
50M	Duquesne Light Co. 3½% Mtge. 4-1-86
9M	Durham Investment Corp. 5% Deb. 12-31-77
320M	Famous Artists Schools, Inc. 5% Conv.. Sub. Deb. 1-1-89
2.5M	Florida East Coast Railway Co. 5% 1st Mtge. 1-1-2011
2.5M	Florida East Coast Railway Co. 5½% 2nd Mtge. Conv. 1-1-2011
700M	Ford Motor Credit Company 6½% Notes 7-15-69
100M	Ford Motor Credit Company 6½% Notes 8-15-69
500M	Ford Motor Credit Company 6½% Notes 9-15-69
10M	Ford Motor Credit Company 6½% Notes 9-15-69
254M	Ford Motor Credit Company 6½% Notes 9-15-69
85M	Ford Motor Credit Company 7¼% Notes 9-15-69
25M	Ford Motor Credit Company 6½% Notes 11-17-69
50M	General Electric Co. 3½% Deb. 5-1-76
800M	General Motors Acceptance Corp. 8⅜% Notes 7-24-69
100M	General Motors Acceptance Corp. 6½% Notes 8-15-69
300M	General Motors Acceptance Corp. 6½% Notes 9-15-69
500M	General Motors Acceptance Corp. 6½% Notes 9-15-69
30M	General Motors Acceptance Corp. 6½% Notes 10-15-69
20M	General Motors Acceptance Corp. 6½% Notes 10-15-69
30M	General Motors Acceptance Corp. 7¼% Notes 10-15-69
459.5M	General Motors Acceptance Corp. 6½% Notes 11-17-69
780M	General Motors Acceptance Corp. 7¼% Notes 11-17-69
100M	General Motors Acceptance Corp. 3% Deb. 7-15-69
125M	General Motors Acceptance Corp. 3½% Deb. 3-15-72
100M	General Motors Acceptance Corp. 4⅝% Deb. 9-1-82
50M	General Motors Acceptance Corp. of Canada, Ltd. 4¾% Deb. 12-15-69
150M	General Motors Corp. 3¼% Deb. 1-1-79
100M	Georgia Power Co. 3⅝% Mtge. 7-1-82
55M	Georgia Power Co. 3¾% Mtge. 4-1-83
100M	Georgia Power Co. 3⅝% Mtge. 4-1-84
75M	Georgia Power Co. 3⅝% Mtge. 5-1-85
50M	Georgia Power Co. 3⅝% Mtge. 4-1-86
32M	Georgia Power Co. 5¼% Mtge. 6-1-87
200M	Gordon Jewelry Corp. 5% Conv. Sub. Deb. 6-15-88
50M	Gulf States Utilities Co. 3⅝% Mtge. 12-1-82
100M	Gulf States Utilities Co. 3⅝% Mtge. 12-1-83
50M	Gulf States Utilities Co. 4⅞% Mtge. 10-1-87
200M	Gulf States Utilities Co. 4¾% Mtge. 1-1-89
100M	Gulf States Utilities Co. 5¼% Mtge. 12-1-89
50M	Honeywell, Inc. 4% Deb. 8-1-76
210M	Host International, Inc. 5¼% Conv. Sub. Deb. 4-15-94
75M	Houston Lighting & Power Co. 4¾% Mtge. 11-1-87
95M	Idaho Power Co. 4½% Mtge. 10-15-88
.6M	Ideal Manufacturing Co. 4% Deb. 7-1-69
100M	Illinois Bell Telephone Co. 4⅜% Mtge. 3-1-94
100M	Illinois Power Co. 3½% Mtge. 11-1-83
50M	Illinois Power Co. 3¾% Mtge. 7-1-86
50M	Illinois Power Co. 4% Mtge. 5-1-88
50M	Imperial Oil, Ltd. 3⅝% Deb. 2-1-75
50M	Inland Steel Co. 3½% Mtge. 7-1-81
46M	Inland Steel Co. 4⅜% Mtge. 7-1-87

Duke University Investments—(Continued)

*Bonds
Par Value*

177M	Inland Steel Co. 4½% Mtge. 2-1-89
99M	Iowa Illinois Gas & Electric Co. 4⅞% Mtge. 5-1-91
100M	Kansas City Power & Light Co. 3¼% Mtge. 1-15-83
500M	Kerr-McGee Corporation 3¾% Conv. Deb. 5-1-92
75M	Long Island Lighting Co. 3⅝% Mtge. 10-1-82
125M	Long Island Lighting Co. 3¼% Mtge. 12-1-84
100M	Long Island Lighting Co. 4⅛% Mtge. 5-1-88
98M	P. Lorillard Co. 3¾% Deb. 4-1-78
100M	P. Lorillard Co. 4⅞% Deb. 6-1-86
50M	Louisville Gas and Electric Co. 4⅞% Mtge. 9-1-87
100M	The May Department Stores Co. 3¼% Deb. 2-1-78
400M	McDonald's Corp. 4¼% Conv. Sub. Deb. 8-1-93
250M	Michigan Bell Telephone Co. 4⅜% Deb. 12-1-91
60M	Michigan Bell Telephone Co. 4¾% Deb. 11-1-92
3M	Missouri Pacific Railroad Co. 5% Deb. 1-1-2045
100M	Monongahela Power Co. 4¾% Mtge. 4-1-84
50M	Montana Power Co. 2⅞% Mtge. 10-1-75
200M	Montana Power Co. 4½% Mtge. 4-1-89
180M	Mountain States Telephone & Telegraph Co. 4⅜% Deb. 2-1-88
60M	National Steel Corp. 3⅞% Mtge. 11-1-86
50M	New England Power Co. 3¼% Mtge. 1-1-85
100M	New England Power Co. 4⅝% Mtge. 11-1-91
100M	New England Telephone & Telegraph Co. 3¼% Deb. 12-15-77
50M	New England Telephone & Telegraph Co. 3⅞% Deb. 12-15-88
125M	New Jersey Bell Telephone Co. 3⅞% Deb. 4-1-93
60M	New York State Electric & Gas Corp. 3⅝% Mtge. 9-1-85
100M	New York Telephone Co. 4½% Mtge. 5-15-91
350M	New York Telephone Co. 4⅛% Mtge. 7-1-93
50M	New York Telephone Co. 3⅝% Mtge. 4-1-96
75M	Niagara Mohawk Power Corp. 3½% Mtge. 2-1-83
50M	Niagara Mohawk Power Corp. 3⅝% Mtge. 5-1-86
50M	Niagara Mohawk Power Corp. 4⅞% Mtge. 9-1-87
50M	Niagara Mohawk Power Corp. 3⅞% Mtge. 6-1-88
100M	Northern Indiana Public Service Co. 4½% Mtge. 1-15-89
48M	Northern States Power Co. 4⅝% Mtge. 6-1-87
200M	Northwestern Bell Telephone Co. 4⅜% Deb. 3-1-2003
65M	Ohio Edison Co. 3¼% Mtge. 1-1-84
150M	Ohio Edison Co. 4½% Mtge. 4-1-89
125M	Ohio Power Co. 3⅝% Mtge. 1-1-83
50M	Ohio Power Co. 4¼% Mtge. 11-1-86
200M	Ohio Power Co. 4⅝% Mtge. 4-1-89
120M	Pacific Gas & Electric Co. 3⅞% Mtge. 6-1-84
35M	Pacific Gas & Electric Co. 4½% Mtge. 12-1-86
50M	Pacific Gas & Electric Co. 3⅝% Mtge. 12-1-88
50M	Pacific Gas & Electric Co. 5% Mtge. 6-1-89

Duke University Investments—(Continued)

*Bonds
Par Value*

100M	The Pacific Telephone & Telegraph Co. 3¼ % Deb. 11-15-79
50M	The Pacific Telephone & Telegraph Co. 5½ % Deb. 8-1-80
250M	The Pacific Telephone & Telegraph Co. 4¾ % Deb. 8-15-88
150M	The Pacific Telephone & Telegraph Co. 3½ % Deb. 11-15-89
200M	The Pacific Telephone & Telegraph Co. 4¾ % Deb. 11-1-90
100M	Pennsylvania Power & Light Co. 4¾ % Mtge. 12-1-91
115M	Philadelphia Electric Co. 3½ % Mtge. 4-1-85
100M	Pillsbury Mills, Inc. 3½ % Deb. 12-1-72
50M	Plantation Pipe Line Co. 3½ % Deb. 4-1-86
60M	Province of Ontario, Canada 3¼ % Deb. 9-1-72
200M	Province of Ontario, Canada 3¼ % Deb. 2-1-75
75M	Province of Ontario, Canada 3½ % Deb. 3-15-80
200M	Province of Ontario, Canada 4¾ % Deb. 2-1-84
55M	Public Service Co. of Indiana, Inc. 3¾ % Mtge. 1-1-84
200M	Public Service Co. of Indiana, Inc. 4¾ % Mtge. 2-1-89
50M	Public Service Electric & Gas Co. 3¼ % Mtge. 5-1-84
200M	Public Service Electric & Gas Co. 4¾ % Mtge. 8-1-88
191M	San Diego Gas & Electric Co. 4¾ % Deb. 1-15-84
.2M	Scarsdale Golf Club, Inc. 4 % Bonds 12-1-74
100M	Sears, Roebuck Acceptance Corp. 6¾ % Notes 9-15-69
997.5M	Sears, Roebuck Acceptance Corp. 6½ % Notes 10-15-69
208M	Sears, Roebuck Acceptance Corp. 6½ % Notes 10-15-69
50M	Southern Bell Telephone & Telegraph Co. 4 % Deb. 10-1-83
150M	Southern Bell Telephone & Telegraph Co. 4¾ % Deb. 12-1-93
100M	Southern Bell Telephone & Telegraph Co. 4¾ % Deb. 3-1-98
50M	Southern California Edison Co. 3¾ % Mtge. 8-15-78
59M	Southern California Edison Co. 3¾ % Mtge. 4-15-81
40M	Southern California Edison Co. 4¼ % Mtge. 2-15-82
48M	Southern California Edison Co. 4¾ % Mtge. 7-1-82
50M	Southern California Edison Co. 4¾ % Mtge. 9-1-82
75M	Southern California Edison Co. 4¾ % Mtge. 9-1-85
100M	Southern California Edison Co. 4½ % Mtge. 4-1-86
70M	Southern California Edison Co. 4¾ % Mtge. 5-15-88
1,000M	Southern California Edison Co. 5¼ % Mtge. 5-15-91
100M	Southern California Gas Co. 3¾ % Mtge. 6-1-81
50M	Southern New England Telephone & Telegraph Co. 3½ % Deb. 3-1-78
300M	Southland Corp. 5½ % Conv. Sub. Ded. 3-15-89
.1M	State of Israel Savings Bond 11-1-80
50M	Sterling Drug Co., Inc. 3¼ % Deb. 4-1-80
50M	The Superior Oil Co. 3¾ % Deb. 7-1-81
50M	Tampa Electric Co. 4¼ % Mtge. 7-1-88
32M	Tennessee Gas Transmission Co. 6 % Deb. 11-1-77
250M	The Trane Company 4 % Conv. Deb. 9-15-92
100M	Trans-World Airlines, Inc. 4 % Conv. Deb. 3-1-92

Duke University Investments—(Continued)

Bonds
Par Value

50M	Union Electric Co. 3¾ Mtge. 7-1-86
100M	Union Electric Co. 4¾ % Mtge. 3-1-88
50M	United States Steel Corp. 4% Deb. 7-15-83
200M	United States Steel Corp. 4½ % Deb. 4-15-86
200M	Utah Construction & Mining Co. 5% Conv. Deb. 11-1-92
50M	Utah Power & Light Co. 3½ % Mtge. 10-1-82
50M	Virginia Electric & Power Co. 4½ % Mtge. 10-1-86
100M	Virginia Electric & Power Co. 4½ % Mtge. 12-1-87
100M	Virginia Electric & Power Co. 4¾ % Mtge. 6-1-91
25M	Virginia Electric & Power Co. 7½ % First & Ref. Bond 1-1-99
50M	The Washington Water Power Co. 4¾ Mtge. 7-1-87
50M	West Penn Power Co. 4¾ % Mtge. 7-1-87
25M	West Virginia Pulp & Paper Co. 4% Deb. 1-1-78
250M	Wisconsin Electric Power Co. 3¾ % Mtge. 4-15-86
100M	Wisconsin Power & Light Co. 4¾ % Mtge. 3-1-89
50M	Wisconsin Telephone Co. 4½ % Deb. 7-1-92

Stocks
No. of Shares

150	Advance Metal Products, Inc.
24,000	Alcan Aluminum, Ltd.
40	American Brands, Inc.
600	American Cyanamid Co.
26	American Educational Life Ins. Co.
11,500	American Hospital Supply Corp.
27,000	American Telephone & Telegraph Co.
13,206	Ampex Corp.
3,800	Anheuser-Bush, Inc.
9,000	Arkansas-Louisiana Gas Co.
5,000	Atlantic Richfield Co. 2.80% Cumulative Convertible
12,000	Avery Products Corp.
2,000	Avon Products, Inc.
8,000	Baltimore Gas & Electric Co.
10,250	Becton, Dickinson & Co.
10,000	Bristol-Myers Co.
39	Bush Universal
100	Business Development Corp. of North Carolina
1,505	Cannon Mills Co.
2,605	Cannon Mills Co. B
1,504	Carolina Casualty Insurance Company
6,450	Carolina Power & Light Co.
3,200	Carolina Pacific Plywood
11	The Chesapeake Life Insurance Co.

Duke University Investments—(Continued)

<i>Stocks</i>	
<i>No. of Shares</i>	
25,532	Cincinnati Gas & Electric Co.
3	Circuit Foil Corp.
18,500	Coca-Cola Co.
11	Columbia Pictures Corp.
11,409	Commonwealth Edison Co.
5	Continental Airlines
3,500	Control Data Corporation
2,500	Corning Glass Works
4,000	Cummins Engine Co.
6	Curtiss Wright Corp.
15,189	Dayton Power & Light Co.
157,200	Duke Power Company
2,000	E. I. Dupont de Nemours and Company
600	Durham Investment Corp.
36,120	Eastman Kodak Co.
15,670.26	F. A. S. International, Inc.
15,000	The Fidelity Corp. of Pennsylvania
7,000	F. M. C. Corporation
346.606	Fidelity Trend Fund, Inc.
10,000	First National Bank of Boston
13,000	First National City Corporation
700	Federated Dual Exchange, Capital Stock
160	Florida East Coast Railway Co.
21,852	Ford Motor Co.
5,666	Franklin Life Insurance Co.
11,000	General Electric Co.
8,500	General Foods Corp.
5,545	General Motors Corp.
3,336	General Motors Corp. \$5.00 Series Cumulative
13,000	General Telephone & Electronics Corp.
11,000	Georgia Pacific Corporation, \$1.64 Cumulative Convertible
8,010	The Gillette Co.
18,704	Gulf Oil Corp.
8,483	Hanes Corporation
1,800	Harcourt, Brace & World, Inc.
10,000	Honeywell, Inc.
5,000	Houston Natural Gas Corp. Class A Cumulative
11,800	Indianapolis Power & Light Co.
27,829	International Business Machines Corp.
7,314	International Flavors & Fragrances, Inc.
24,702	International Telephone & Telegraph Corp.
3,378	International Telephone & Telegraph Corp. \$4.00 Series K, Convertible
4,088	Jefferson Pilot Corporation
4,132	J. A. Jones Construction Co.
605	J. A. Jones Construction Co. 5% Pfd.

Duke University Investments—(Continued)

Stocks
No. of Shares

15,000	Kansas City Power & Light Co.
10	Kendall Co.
30	Long Meadow Farms Cooperative, Inc. 6% Cum. Pfd.
15,800	Louisiana Land & Exploration Co.
10,000	Marathon Oil Co.
9,500	Marriott Corp.
50	Martin Marietta Corp.
18,408	Maryland Cup Corp.
12,000	Maryland National Corp.
1,705.4	Massachusetts Growth Stock Fund
4,000	Merck & Co., Inc.
12,000	Middle South Utilities, Inc.
8,000	Minnesota Mining & Manufacturing Co.
10,846	Mobil Oil Corp.
10,000	Morgan (J. P.) & Co.
3,300	Motorola, Inc.
33,612	NCNB Corporation
4,900	NLT Corporation
11,000	The National Cash Register Co.
430	National Savings Life Insurance Co.
104	North State Bank, Burlington, N. C.
22,800	Ohio Edison Co.
14,600	Pacific Gas & Electric Co.
200	Pacific Lighting Corp. \$4.36 Pfd.
3	Pamlico Power & Light Co., Inc. 5% Pfd.
16,000	PepsiCo Inc.
15,000	Philip Morris, Inc.
5,000	Pinkerton, Inc. B
13,000	Pitney-Bowes, Inc.
8,224	Polaroid Corp.
6,100	The Procter & Gamble Co.
10,000	Public Service Co. of New Mexico
3	Pyramid Life Insurance Company
6,500	Revlon, Inc.
38,000	R. J. Reynolds Tobacco Company
3	Richmond Corporation
8,600	Robins (A. H.) Co., Inc.
12,000	Rollins, Inc.
92,486	Rowe Price New Horizons Fund, Inc.
8,000	Scott Paper Co.
8,500	Sears, Roebuck & Co.
5,250	South Carolina Electric & Gas Co.
8,000	The Southern Co.
7,000	Southern Union Gas Co.
12,000	Southland Corp.

Duke University Investments—(Continued)

*Stocks**No. of Shares*

9,332	Southwestern Life Insurance Co.
430	Spindale Mills, Inc.
5	Standard Oil Co. (California)
18,989	Standard Oil Co. of New Jersey
32,799	Texaco, Inc.
1,000	Texas Eastern Transmission Corp. 5% Pfd.
7,000	Texas Instruments, Inc.
60	The Travelers Corp.
600	United Durham, Inc. Class B
843	United Utilities, Inc., 2nd Series
125	U S Plywood Champion Paper
10,000	The Wachovia Corp.
50	Waddell & Reed
19,000	Warner-Lambert Pharmaceutical Co.
15,600	Zerox Corp.
10,500	Zenith Radio Corp.

GIFTS AND BEQUESTS

Duke University derives its principal support from endowment funds and from miscellaneous gifts and grants. Permanently invested capital funds enable the University to offer to students academic and professional training at a fraction of its actual cost. The effectiveness of the University is determined to a large extent by its financial resources.

Gifts and bequests devoted to the improvement of the work of the University will be received and administered by the Trustees in accordance with the desires of the honor.

GIFTS. Any kind of property, real or personal, may be the subject of a gift and only such form as is required to pass title is necessary. If the gift consists of real property, the title will be passed by deed; if it consists of cash or unregistered bonds, the gift is consummated by delivery of the property; or if stocks by delivery properly endorsed stock certificates. Unless restricted, the use of gift is at the discretion of the Board of Trustees. Usually the proceeds, conservatively invested, are added to the permanent endowment of the University. The donor may, however, restrict the use of any gift and designate definitely the object for which it shall be used. In such cases, the transfer of property should be accompanied by a letter or other document describing in detail the objects for which the proceeds of the gift are to be used and when accepted by the University the terms or conditions set out therein become binding upon it.

BEQUESTS. Bequests may be made to the University by an appropriate clause inserted in a will or by codicil to a will already drawn. The forms shown on the following pages will serve as appropriate clauses for wills or codicils.

FORMS FOR BEQUESTS

General

I give, devise and bequeath to Duke University, a corporation existing under the laws of the State of North Carolina and located in the City and County of Durham, State of North Carolina, and its successors forever, the sum of Dollars
(or otherwise describe the gift) for the general purposes and uses of the University at the discretion of the Board of Trustees.

Specific

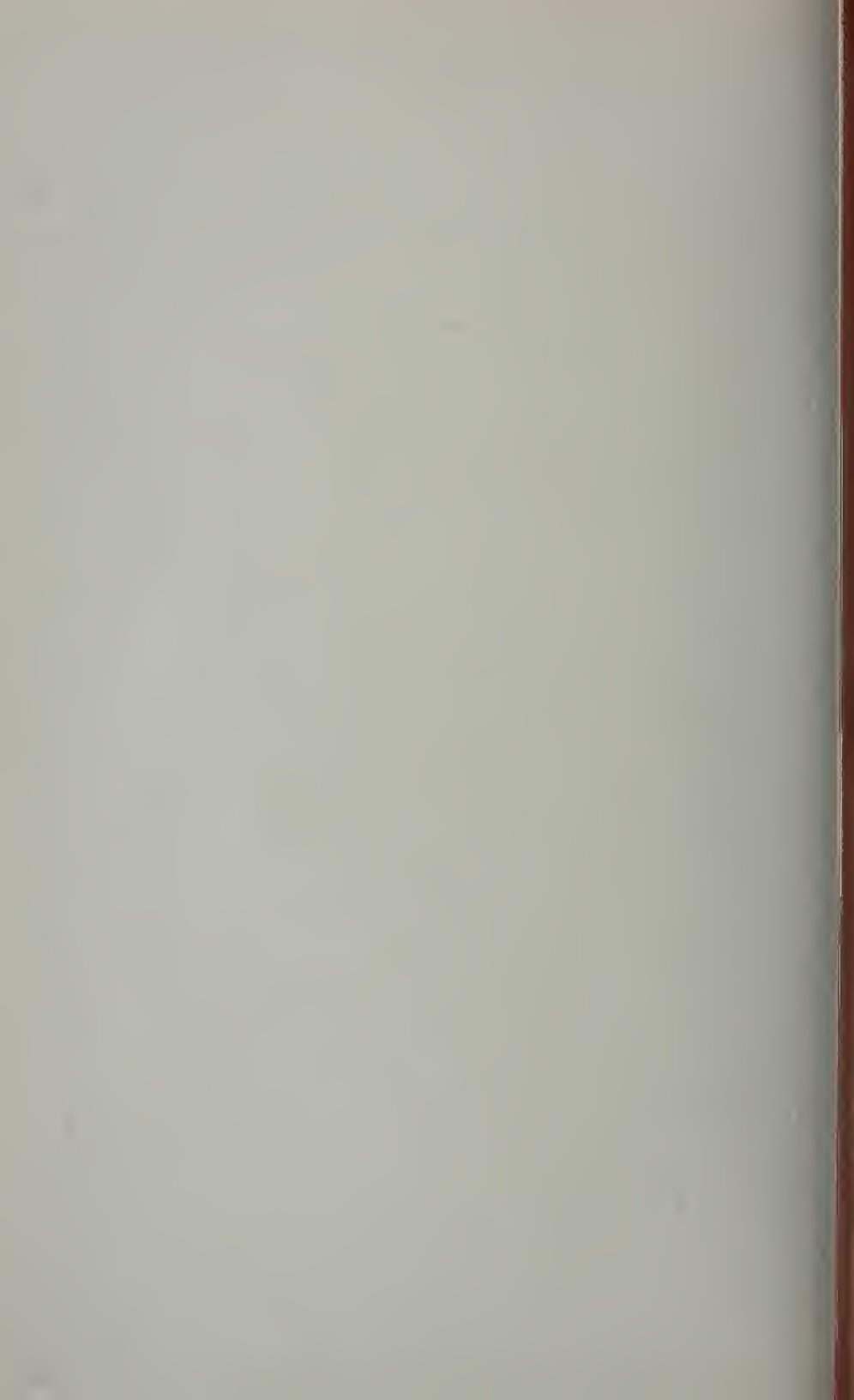
I give, devise and bequeath to Duke University, a corporation existing under the laws of the State of North Carolina and located in the City and County of Durham, State of North Carolina, and its successors forever, the sum of Dollars
(or otherwise describe the gift) and direct that the income therefrom shall be used for the following purposes, viz. (here describe in detail the use desired).

Codicil

Having hereinbefore made my last Will and Testament dated, and being of sound mind, I hereby make, publish, and declare the following codicil thereto; (here insert clause in same form as if it had been included in body of Will). Except as hereinbefore changed, I hereby ratify, confirm and republish my said last Will and Testament.

(It is strongly recommended that a competent lawyer be employed to prepare the will and to supervise its execution in order to comply with all the requirements of the law of the state in which the maker of the will resides. It is also wise to give the University considerable latitude in the use of any fund so that a change of circumstances may not impair the usefulness of the gift. The Treasurer of the University will be glad upon request to review the phrasing of any proposed form of bequest.)





BULLETIN OF DUKE UNIVERSITY

The School of Forestry

1970



Annual Bulletins

- For *Bulletin of Information for Prospective Students*, apply to Office of Undergraduate Admissions, Duke University, Durham, N. C. 27706
- For *Bulletin of Undergraduate Instruction*, apply to the Registrar, Duke University, Durham, N. C. 27706
- For *Bulletin of the Graduate School*, apply to the Dean of the Graduate School, Duke University, Durham, N. C. 27706
- For *Bulletin of the Summer Session*, apply to the Director of the Summer Session, Duke University, Durham, N. C. 27706
- For *Bulletin of the Divinity School*, apply to the Dean of the Divinity School, Duke University, Durham, N. C. 27706
- For *Bulletin of the School of Engineering*, apply to the Registrar, Duke University, Durham, N. C. 27706
- For *Bulletin of the School of Forestry*, apply to the Dean of the School of Forestry, Duke University, Durham, N. C. 27706
- For *Bulletin of the School of Law*, apply to the Dean of the School of Law, Duke University, Durham, N. C. 27706
- For *Bulletin of the Marine Laboratory*, apply to the Director, Duke University Marine Laboratory, Beaufort, N. C. 28516
- For *Bulletin of the School of Medicine*, apply to the Dean of the School of Medicine, Duke University, Durham, N. C. 27706
- For *Bulletin of the School of Nursing*, apply to the Dean of the School of Nursing, Duke University, Durham, N. C. 27706
- For *Directory of the Officers, Faculty and Staff*, apply to Office of the Secretary, 215 Allen Building, Duke University, Durham, N. C.
- For *Bulletin of the Graduate School of Business Administration*, apply to the Dean of the Graduate School of Business Administration, Duke University, Durham, N. C. 27706
- For *Bulletin of the Physician's Assistant Program*, apply to the Director, Physician's Assistant Program, Duke University, Durham, N. C. 27706
- For *Bulletin of Faculty Publications*, apply to the Office of the Vice Provost for Academic Administration, Duke University, Durham, N. C. 27706
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Cover design is adapted from a photograph of a carving in the entrance to Crowell Quadrangle.

BULLETIN OF DUKE UNIVERSITY

The School of Forestry
1970-1971

Durham, North Carolina 1970

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School of Forestry Calendar

1970

September

- 17-18 Consultation with advisers for new students
- 18 Friday—Registration for new and non-preregistered returning students
- 19 Saturday—Final registration of all preregistered students
- 20 Sunday—University Convocation
- 21 Monday—Fall semester classes begin

November

- 25 Wednesday—12:30 p.m. Thanksgiving recess begins
- 30 Monday—8:10 a.m. Classes resumed

December

- 11 Friday—Founder's Day
- 19 Saturday—12:30 p.m. Christmas recess begins

1971

January

- 4 Monday—8:10 a.m. Classes are resumed
- 16 Saturday—12:30 p.m. Fall semester classes end
- 21 Thursday—Mid-year examinations in the School of Forestry begin
- 30 Saturday—Mid-year examinations in the School of Forestry end

February

- 4 Thursday—Registration for new students and non-preregistered returning students
- 6 Saturday—Last day for matriculation for the Spring semester
- 8 Monday—Spring semester classes begin

March

27 Saturday—12:30 p.m. Spring recess begins. Spring field trips

April

5 Monday—8:10 a.m. Classes are resumed

May

20 Thursday—5:00 p.m. Spring semester classes end

24 Monday—Final examinations begin

June

2 Wednesday—Final examinations end

5 Saturday—Commencement begins

6 Sunday—Commencement sermon

7 Monday—Graduation exercises

A forest pathologist engaged in the study of air, water, and timber quality.



Officers of the University

General Administration

Barnes Woodhall, M.D., *Chancellor pro tem*

Marcus E. Hobbs, Ph.D., *Provost*

Charles B. Huestis, *Vice President for Business and Finance*

William G. Anylan, M.D., *Vice President for Health Affairs*

Frank Leon Ashmore, A.B., *Vice President for Institutional Advancement*

Gerhard Chester Henriksen, M.A., C.P.A., *Vice President and Treasurer*

Everett Harold Hopkins, M.A., LL.D., *Vice President for Regional Programs*

Harold W. Lewis, Ph.D., *Vice Provost and Dean of Faculty*

John C. McKinney, Ph.D., *Vice Provost and Dean of the Graduate School*

James L. Price, Jr., Ph.D., *Vice Provost and Dean of Undergraduate Education*

Craufurd David Goodwin, Ph.D., *Vice Provost and Director of International Programs*

Benjamin Edward Powell, Ph.D., *Librarian*

Clark R. Cahow, Ph.D., *University Registrar*

Rufus H. Powell, LL.B., *Secretary of the University*

Stephen Cannada Harward, A.B., C.P.A., *Assistant Secretary and Controller*

Edwin Constant Bryson, LL.B., *University Counsel*

School of Forestry Administration

Charles William Ralston, M.F., Ph.D., *Dean of the School of Forestry*

Fred Myerle White, M.F., *Director of the Duke Forest and Assistant to the Dean*

Leon Edward Chaiken, M.F., *Director of Admissions*

Kenneth Richard Knoerr, M.F., Ph.D., *Director of Graduate Studies in the Department of Forestry of the Graduate School*

School of Forestry Faculty and Staff

Roger Fabian Anderson (1951), M.S., Ph.D., *Professor of Forest Entomology*

Robert Lloyd Barnes (1965), M.F., Ph.D., *Professor of Forest Biochemistry*

Leon Edward Chaiken (1952), M.F., *Professor of Forest Management*

Ellwood Scott Harrar (1936), M.S., Ph.D., Sc.D., *James B. Duke Professor of Wood Science*

Henry Hellmers (1965), Ph.D., *Professor of Botany*

Frederick C. Joerg (1947), M.B.A., *Professor of Business Administration*

Kenneth Richard Knoerr (1961), M.F., Ph.D., *Associate Professor of Forest Meteorology*

Paul Jackson Kramer (1931), M.Sc., Ph.D., *James B. Duke Professor of Botany*

Charles William Ralston (1954), M.F., Ph.D., *Professor of Forest Soils*

Ronald John Slinn (1969), M.Sc., Ph.D., *Associate Professor of Forest Economics*

William James Stambaugh (1961), M.S., Ph.D., *Associate Professor of Forest Pathology*

Fred Myerle White (1959), M.F., *Assistant Professor of Silviculture*

David Owen Yandle (1967), M.S., Ph.D., *Associate Professor of Forest Mathematics*

Associate Faculty

Donald J. Fluke, Ph.D., *Professor of Zoology*

Aubrey W. Naylor, Ph.D., *Professor of Botany*

Joseph J. Spengler, Ph.D., *James B. Duke Professor of Economics*

Adjunct Faculty

Edgar W. Clark, Ph.D., *Adjunct Associate Professor of Forest Entomology*

Charles S. Hodges, Jr., M.F., Ph.D., *Adjunct Associate Professor of Forest Pathology*

Louis J. Metz, M.F., Ph.D., *Adjunct Associate Professor of Forest Soils*

Fred M. Vukovich, Ph.D., *Adjunct Associate Professor of Forest Meteorology*

Staff

Mrs. Patricia S. Rorie, *Recorder and Secretary to the Dean*

E. Otto Griffin, Jr., *Superintendent, Duke Forest*

Mrs. Edwina Johnson, B.S. in L.S., *Librarian, Forestry-Biology*

Mrs. Sue P. Hicks, *Secretary, Duke Forest*

Mrs. Nancy A. McMannen, *Secretary*

Mrs. Jo W. Russell, *Secretary*

Miss Vivian M. Tonn, *Secretary*

Faculty Emeriti

James Granville Osborne, B.S., *Professor Emeritus of Forest Biometry*

Albert Edward Wackerman, M.F., *Professor Emeritus of Forest Utiliza-
tion*

Frederick Adolphus Wolf, Ph.D., *James B. Duke Professor Emeritus of
Botany*

General Information

Duke and the School of Forestry

Duke University, located at Durham, North Carolina, comprises Trinity College, The Woman's College, the School of Engineering, the Graduate School, and the professional schools of Forestry, Divinity, Law, Medicine, Business Administration, and Nursing. The University dates from 1838, when Union Institute was founded in Randolph County by the Methodists and Friends. In 1851 the institution became Normal College, one of the first schools in America for the training of teachers. In 1859 the name was changed to Trinity College and so continued until 1924, when the College became a part of Duke University.

By virtue of an indenture of trust, executed December 11, 1924, by James Buchanan Duke, a great benefaction was placed at the disposal of humanity by providing for hospitalization, church work in rural communities, and education. The principal feature of the educational provision was the creation of Duke University.

The University, with a student body totaling 8,000, occupies two campuses. The Woman's College campus of 108 acres was formerly the campus of Trinity College. About a mile west are the newer units of the University, known as the West Campus, totaling 467 acres. It was first occupied in September, 1930.

Forestry at Duke University began early in 1931 when the Duke Forest was placed under intensive forest management, and forestry research

was initiated. An academic-forestry curriculum, designed for men and women intent upon pursuing the study of forestry as a profession, was organized in Trinity College of Duke University in 1932. This program was enlarged in 1952 and now includes more than sixty cooperating colleges and universities. (See pages 14-15.)

In 1938 the School of Forestry was organized at the graduate level and a curriculum was offered leading to the degree of Master of Forestry. Work leading to the degree of Doctor of Forestry has been offered since 1940. The School has been fully accredited since its origin. A degree in forestry at the undergraduate level is not offered at Duke University.

Graduates of recognized colleges and universities, professional schools of forestry, and other students who meet the entrance requirements of the School (see page 19), may enroll for training in forestry leading to the professional degrees—Master of Forestry and Doctor of Forestry. The Department of Forestry in the Graduate School also offers graduate work in certain aspects of forestry leading to the degrees of Master of Science and Doctor of Philosophy. This work is available to graduates of schools of forestry of recognized standing, and to college or university graduates holding a bachelor's degree.

Forest biochemists study physiological effects of air pollutants.



Courses of Study and Requirements for Degrees

Basic scientific or professional programs of study are available in the following fields of forestry and related natural resources. Interdisciplinary programs between fields within the School of Forestry and those in other departments of the University also are possible and strongly encouraged.

Biological Science

Forest Ecology
Tree Physiology and Biochemistry
Forest Pathology
Forest Entomology
Dendrology and Wood Anatomy

Statistics and Operations Research

Biometry and Statistics
Mensuration
Operations Research

Environmental Science

Forest Soils
Forest Meteorology and
 Biometeorology
Wildland Hydrology

Economics and Management

Natural Resources Economics and
 Policy
Forest Management

With exception of forest management, study in all of the above fields can be pursued in programs for a M.S., A.M., or Ph.D. degree in the

Department of Forestry of the Graduate School, or in a professional program for a M.F. or D.F. degree from the School of Forestry. Work in forest management is in professional M.F. and D.F. degree programs of the School of Forestry. Students contemplating careers in teaching and research are strongly urged to follow courses of study in the Department of Forestry in the Graduate School.

In addition, the following special management or business-oriented programs of study leading to the M.F. degree are available in the School of Forestry:

Post Liberal Arts and Science Program
Business Management Program
Forest Protection Program
Academic-Forestry Program

Detailed information on these special programs is given under the Master of Forestry Degree and the Cooperative Plan of Study sections of this *Bulletin*.

Courses available in the various fields of forestry and related natural resources are indicated in a later section of this *Bulletin*.

Master of Forestry Degree

The requirements for the degree of Master of Forestry (M.F.) are governed by the extent of the student's previous professional training. Normally, students who have earned the degree of Bachelor of Science in Forestry, or the equivalent, from an accredited school of forestry may complete the requirements for the M.F. degree in one academic year. Students who have had no prior professional training in forestry are required to complete five semesters of resident study. Graduate work of equivalent grade done in residence at other institutions may, with the approval of the faculty, be accepted as credit toward the degree, but a minimum of one year of residence at Duke University is required.

The submission of a thesis for the M.F. degree usually is required. With the approval of the faculty, an acceptable report on a special study may be submitted in lieu of a thesis, credit for which will not exceed three units. Four copies of the thesis, typewritten and bound in accordance with regulations set forth by the faculty, must be deposited with the dean of the School of Forestry on or before May 15 of the academic year in which the student expects to obtain the M.F. degree.

A student who has not completed his thesis while in residence must submit an acceptable manuscript to the faculty within a period of two years following the termination of his residence.

No student may take less than fourteen nor more than eighteen units of credit per semester without special permission of the faculty.

Post-Professional Program

Students with satisfactory undergraduate professional training qualify for advanced study and research in the various disciplines of forestry under this program. A specific study plan is developed for each student through consultation with a faculty advisory committee. For the student planning a managerial career in the general area of forest production or in forest products technology (and where the Master of Forestry is planned as a terminal degree), these study plans usually consist of courses and seminars with a major portion of the work concentrated in the areas of the student's interests. For the student with research interest, the study plan is oriented within the subject matter field of interest toward the furtherance of a research career, or toward preparing him for academic training beyond the master's level.

A number of courses offered in other departments of the University are open to qualified students in the School of Forestry. One or more of these may be included in a student's study plan when deemed advisable by his advisory committee.

A minimum of thirty units, in which the student must earn a grade of E or G in at least six units, are required for the degree of Master of Forestry, under this program. Normally, fifteen units of credit (including the thesis) must be earned in the School of Forestry.

Post-Liberal Arts and Science Program

Men and women who are college graduates but have had no prior professional forestry training may be admitted to programs of study leading to the degree of Master of Forestry. A minimum of five semesters of work in residence is usually required, including the core courses listed below.

These courses normally are completed during the first year of residence. However, students lacking prerequisites for specific courses may postpone such courses until the prerequisites have been completed.

Core Courses

	<i>Units</i>
Tree Physiology (For. 201)	3
Forest Soils (For. 261)	3
Resource Economics and Policy (For. 269)	3
Forest Measurements (For. 256)	4
General Meteorology (For. 203)	3
Forest Ecology (For. 243)	3
Computer Science in Natural Resources (For. 253)	1
Biometry (For. 250)	3

Dendrology (For. 241)	3
Wood Anatomy (For. 290)	3
Biology of Forest Insects and Diseases (For. 222)	4
Analytical Techniques in Forest Utilization (For. 210)	3
Careers in Natural Resources (For. 200)	0

During the latter part of the first year each student will be requested to designate the field (or fields) he wishes to pursue for a major. After the student has designated his field of interest, he will be assigned a faculty adviser who, in consultation with the student, will develop a program of study in a manner similar to that described under the Post-Professional Program (see page 5).

Any student who does not earn a grade of *E* or *G* in at least six hours of work in the first academic year will not be permitted to enter into the work of the second year.

Business Management Program

A specialized program is offered in the School of Forestry in cooperation with the Department of Economics and the School of Business Administration to prepare forestry graduates for managerial careers in the business aspects of industrial forest land management or forest products. The program requires two years of study and training leading to the degree of Master of Forestry. It is open to selected students who have earned a bachelor's degree (or the equivalent) in general forestry, forest management, forest utilization, or wood science and technology, with the proper prerequisites, and who have potential leadership qualities indicative of administrative and executive capacity.

The general requirements of the program are as follows:

1. At least ten courses (thirty units) in economics and business administration or in closely allied fields.
2. Approximately five courses (fifteen units) in forestry which deal with principles of administration and decision-making.
3. Experience as a paid managerial trainee with a cooperating firm for a period embracing the included summer and fall semester of the second year.
4. A written analysis of some phase of the managerial operation of the organization with which the training period is spent.

A specific program of study, commensurate with each student's academic background and future goals, will be developed by the program advisory committee in consultation with the student. A sample list of suggested courses included in such a program of study is available upon request.

Students entering this program must meet the admission requirements

of the School of Forestry and be approved by a committee representing the faculties of Economics and Forestry. The financial award benefits of the School of Forestry are available to applicants for this program (see pages 33-34). Application forms for admission and financial aid may be obtained from the director of admissions of the School of Forestry upon request.

Forest Protection Program

A combined program of specialization in entomology-pathology is available for students desiring career preparation in the applied aspects of forest insect and disease control. This program of study leads to the Master of Forestry degree. Students electing the program must hold either a bachelor's degree in general forestry or have equivalent preparation in the biological sciences.

The general requirements of the program are as follows:

1. A minimum of twenty-eight units in forest entomology and forest pathology. With approval, credits in closely related disciplines may be substituted.
2. At least twelve units of courses and seminars dealing with managerial and statistical aspects of forest protection.
3. One summer of employment experience with a forest protection agency.
4. Organization, conduct, and report of applied research on a forest insect and/or disease problem (four units).

Reasonable latitude will be permitted in selecting courses to accommodate specific needs and interests. Each program of study will be developed in consultation with the program directors. A list of recommended courses is available upon request.

Applicants for this program must meet the requirements of the School of Forestry and the approval of the program advisory committee. Application forms for admission and financial aid may be obtained from the director of admissions of the School of Forestry.

Master of Science Degree

Prerequisites

The degree of Master of Science (M.S.) is offered through the Department of Forestry in the Graduate School. As a prerequisite to this degree a student must have earned a baccalaureate degree from an accredited college or university. There is no foreign language requirement for this degree.

Major and Minor Subjects

The work for the Master of Science degree is designed to provide a basic foundation in a fundamental area of forestry or in a field closely allied with forestry. A minimum of thirty units of credit is required for the degree; twenty-four units must be in formal courses although not more than six units can be earned for the thesis. Specific course requirements call for a minimum of twelve units in a major field of specialization and six units in a minor area of concentration. The major and minor fields are determined without regard to departmental divisions of the University if the interdisciplinary nature of the area of specialization makes such a program of study advisable. The specific program of study is developed by the major professor (thesis supervisor) subject to the approval of the director of graduate studies in forestry and the dean of the Graduate School.

The Thesis

Filing the Thesis Title. At least one month before presenting the thesis, that is on or *before March 1 for a June degree* or on or *before August 1 for a September degree*, the student must file with the dean of the Graduate School, on the official form, the title of the thesis and declaration of intention to graduate. The title must have the approval of the director of graduate studies in the major department, and of the thesis supervisor. If the student has met the degree requirements before the above deadlines, he must file his intention to graduate one month before the thesis is presented.

Preparing the Thesis. All basic requirements for preparing the thesis are described in the *Manual of Style for Theses and Dissertations*, revised 1961, obtained at the Duke University Book Store, West Campus. The quality of paper, form, and binding are prescribed in the *Manual*.

Submitting the Thesis. Four typewritten copies of the thesis bound in snap binders supplied by the Library must be submitted through the Graduate Office to the dean of the Graduate School on or before May 1 for a June degree or on or before August 15 for a September degree and at least one week before the scheduled date of the student's examination. The copies will then be distributed by the student to the several members of the examining committee. Three copies for the Library will be bound by the Ruzicka Bindery for a fee of \$5.00 a volume. The student will state whether or not he wishes more than three so bound.

The Examining Committee and the Examination

The instructor who directs the student's program appoints an examining committee composed of himself and two other members of the graduate faculty, one of whom must be from a department other than

that of the major. If the student has been permitted to take related work within the major department, the third member may represent the minor field within the department. This committee is submitted for approval to the dean of the Graduate School at least one week preceding the final examination.

The student's committee administers the examination and certifies whether the student has passed or failed by signing the card provided for this purpose by the Graduate Office. This card is used to indicate completion of all requirements for the degree. After a thesis is approved the committee also signs all copies of the thesis, and the candidate then returns the original, the first two carbon copies, and any other copies he wishes bound by Ruzicka to the dean of the Graduate School who deposits them in the University Library.

Master of Arts Degree

The degree of Master of Arts (A.M.) is offered through the Department of Forestry in the Graduate School. As a prerequisite to the degree a student must have earned a baccalaureate degree from an accredited college or university. Students interested in working toward this degree should refer to the *Bulletin of the Graduate School* for specific requirements.

Doctor of Forestry Degree

The degree of Doctor of Forestry (D.F.) is a professional and research degree conferred on those students who have satisfactorily completed specified requirements of advanced study and research.

Work toward the D.F. degree, consisting of advanced studies in a major and a minor field, is offered with majors in the several branches of forestry. A minor may also be elected in forestry or in other areas of specialized study in the University approved by the faculty of the School of Forestry. Prospective students should correspond with the director of admissions of the School of Forestry on all matters pertaining to admission to the School.

Doctor of Philosophy Degree

The Doctor of Philosophy degree (Ph.D.) is conferred through the Graduate School of Duke University. Programs of study and research for men and women working for this degree are directed by faculty members of the School of Forestry who also comprise the graduate faculty of the Department of Forestry in the Graduate School. Both major and minor programs of study are available in the following branches of forestry: forest biochemistry, forest biometry, forest meteor-

ology, forest ecology, forest economics, forest entomology, forest hydrology, forest pathology, forest soils, forest-tree physiology, and wood science including wood anatomy, timber physics, and wood chemistry.

The Ph.D. degree is essentially a research degree. Although course work is a necessary part of the student's program, the mere accumulation of course credits will not be sufficient for attaining this degree. The granting of the Ph.D. is based primarily upon the student's knowledge of a specialized field of study and upon the production of an acceptable dissertation embodying the results of original research.

General Requirements for D.F. and Ph.D. Degrees

The formal requirements, discussed in detail below, for the doctoral degrees are as follows: (1) foreign language; (2) major and minor courses; (3) supervisory committee for program of study; (4) residence; (5) preliminary examination; (6) dissertation; and (7) final examination. In order to be considered for candidacy for a doctoral degree, the student must have passed all of his course work in the first year of graduate study; on at least 9 units of course work in the first year he must have made a grade of *C* or better.

Foreign Language Requirements

For a detailed discussion of the foreign language requirements for a doctoral degree, the *Bulletin of the Graduate School* should be consulted.

Major or Minor

The student's program of study necessarily demands substantial concentration on courses in his major department. It must, however, include a minimum of six units in a minor subject or related fields approved by his major department. Use of related fields within the major department requires the approval of the dean.

Committee to Supervise the Program of Study

As early in a student's course of study as is practicable and *not later than two months before the preliminary examination* the director of graduate studies in the major department will nominate for the approval of the dean a supervising committee of five, with one member designated as chairman. This committee will include at least three members of the major department and one from the minor department, if a minor is involved. This committee will approve the program of study, as well as administer the preliminary examination and the final doctoral examination. Should all members of the committee be from the major depart-

ment, at least one member of another department will be added or substituted for the final doctoral examination. The final examination may be administered with a minimum of four members.

When the preliminary examination is arranged, the committee and the director will submit to the dean the student's program of study bearing a statement that the Department's course and language requirements have been, or are being, completed.

Residence

The *minimum* registration requirement is sixty units of graduate credit, not more than thirty units of which may be accepted by transfer. Since a full program is thirty units per academic year, the prospective doctoral candidate who enters with an A.B. or B.S. degree must plan to spend in residence a *minimum* of two academic years; if he enters with an A.M., M.S., or M.F. degree his *minimum* residence is one academic year. If there are undergraduate deficiencies in his program, he may, in addition to the minimum requirements, be required to take preliminary undergraduate courses for which he will not receive graduate credit. Even if there are no such undergraduate deficiencies, the student's supervisory committee will determine what requirements, if any, above the minimum the student must meet.

See pages 21-23 for further information on registration in residence and *in absentia*.

Time Limitations. At the time that the preliminary examination is passed any courses, language certifications, or other credits for advanced standing which are more than six calendar years old will not be accepted toward fulfilling the minimum requirements of the doctoral degree.

The student should normally pass the preliminary examination by the end of his second year of graduate study. If he has not passed it by the middle of the third year, he must file with the dean a statement explaining the delay and setting a date for the examination. Except under unusual circumstances, extension will not be granted beyond the end of the third year.

The doctoral dissertation should be submitted and accepted within two calendar years after the preliminary examination is passed. Should the dissertation not be submitted and accepted within four years after the examination, the candidate, with the approval of his committee, may petition the dean for an extension of one year. Should this extension be granted and the dissertation not be submitted and accepted within the year, the student to remain a candidate for the degree must pass a second preliminary examination. In such a case, the time limit for submitting the dissertation will be determined by the dean and the candidate's committee.

Preliminary Examination

A student is not accepted as a candidate for the doctoral degree until he has passed the preliminary examination. A transfer student who may have passed a preliminary examination elsewhere must nevertheless take the examination at Duke. The examination ordinarily covers both the major and minor fields.

In the summer, a preliminary examination may be scheduled only between the opening and closing dates of the summer session.

Privilege of Re-Examination. Should the student fail the preliminary examination, he may apply, with the consent of his supervisory committee and of the dean, for the privilege of a second examination to be taken no sooner than three months after the date of the first. Failure on the second examination will render the student ineligible to continue his program for the doctoral degree at Duke University.

The Dissertation

The dissertation is expected to be a mature and competent piece of writing, embodying the results of significant and original research.

Filing Title. Not later than March 1 (March 2 if March 1 falls on Sunday) preceding the June commencement at which the degree is expected to be conferred, the student must file with the dean of the appropriate school, on the official form to be obtained from the Graduate Office, the title of the dissertation. This title must receive the written approval of both the director of graduate studies of the student's major department and the professor who directs the dissertation.

Form. The basic requirements for preparing the dissertation such as quality of paper, form, and binding are prescribed in the instructions for microfilming (see below) and in the *Manual of Style for Theses and Dissertations*, revised 1961, to be obtained from the Duke University Book Store, West Campus.

Submitting Dissertation. The dissertation must be completed to the satisfaction of the instructor who directs it. Four typewritten copies bound in snap binders secured through the Graduate Office must be deposited with the dean of the appropriate school on or before April 15 preceding the June commencement when the degree is to be conferred. The dissertation must be submitted at least seven days before the scheduled date of the student's examination.

Publication on Microfilm. All doctoral dissertations will normally be published on microfilm through University Microfilms, Ann Arbor, Michigan. Authors may, if they wish, also copyright them. The abstract will be published in *Dissertation Abstracts*. Before final typing is completed, the candidate should obtain in the Graduate School Office detailed instructions on the procedure, together with a microfilming agreement

which is signed and returned when the dissertation is finally deposited in the Graduate School Office.

In brief, all copies of the dissertation, the original in clean type, will remain unbound except for spring binders. Ten copies of an abstract, carefully written and not more than 600 words long, are submitted when the dissertation is first presented. A non-returnable dissertation fee of \$25 is charged for handling and microfilming. If copyright is desired, an additional fee of \$7 plus 2½ cents per page is charged. The original and two carbon copies will be bound by the Ruzicka Bindery for a fee of \$5.00 a volume. The student may request that more than the three copies be so bound.

Final Examination

The final oral examination shall be primarily on the dissertation. Questions may, however, be asked in the candidate's major field. Except in unusual circumstances approved by the dean, a final examination will not be scheduled when school is not in session.

If a student fails his final examination, he may be allowed to take it for a second time, but not sooner than six months from the date of his first. Permission to take the second examination must be obtained from the instructor who directed the dissertation and from the dean. Failure to pass the second examination renders the student ineligible to continue work for the doctoral degree at Duke University.

The Forestry Computing Laboratory has access to an IBM 360/75 computer via a teletype terminal.



Cooperative Plan of Study with Selected Colleges and Universities

Since its inception the Duke School of Forestry has had the cooperation of Trinity College (the men's undergraduate college of arts and sciences of Duke University) in preparing students for professional careers in forestry. Under the plan, a student devotes his first three years to a coordinated and carefully integrated program of study in the basic arts and sciences in Trinity College. The five following semesters are spent in the School of Forestry. Upon the successful completion of this five and one-half year course of study, a student will have earned the Bachelor of Science degree from Trinity College and the professional Master of Forestry degree from the Duke School of Forestry.

Based upon the experience and success of this cooperative program with Trinity College, the School of Forestry in 1952 initiated similar programs of collaboration with a selected group of colleges and universities located throughout the United States. These programs offer students the numerous advantages of a broad background in liberal arts and sciences as preparation for later professional training. A student intent upon following such a course of study should make application to one of the colleges listed on pages 15-18. Admission requirements and other information pertinent to matriculation may be obtained from each of these institutions. Not later than the end of the first semester of the third year in the college or university of his choice, the student may make formal application for admission to the Duke University School of Forestry.

To qualify for admission under these programs, a student must have followed a course of study arranged in consultation with his adviser, must have the official recommendation of his college, and must meet the minimum requirements for admission to the Duke School of Forestry.

Institutions Cooperating with the School of Forestry in the Academic-Forestry Program

Alabama

Samford University Birmingham 35209

Arkansas

Little Rock University Little Rock 72204

Colorado

Colorado College Colorado Springs 80903

Florida

Florida Southern College Lakeland 33802

Rollins College Winter Park 32791

Stetson University, College of Liberal Arts DeLand 32720

Georgia

Mercer University Macon 31207

Illinois

Illinois Wesleyan University, College of Liberal Arts Bloomington
61710

Indiana

Butler University, College of Liberal Arts and Sciences Indianapolis
46207

Indiana Central College Indianapolis 46227

Iowa

Iowa Wesleyan College Mount Pleasant 52641

Kansas

Baker University Baldwin 66006

Louisiana

Centenary College of Louisiana Shreveport 71104

Maryland

Western Maryland College Westminster 21158

Michigan

Albion College Albion 49224

Mississippi

Millsaps College Jackson 39210

Missouri

William Jewell College Liberty 64068

Nebraska

Doane College Crete 68333

New Jersey

Drew University, College of Liberal Arts Madison 07940

New York

Hofstra University Hempstead, Long Island 11550

North Carolina

Catawba College Salisbury 28144

Duke University, Trinity College Durham 27706

Guilford College Guilford College 27410

High Point College High Point 27262

Wake Forest College Winston-Salem 27106

Ohio

Baldwin-Wallace College Berea 44017

Denison University, A College of Liberal Arts and Sciences
Granville 43023

Heidelberg College Tiffin 44883

Kent State University, College of Liberal Arts Kent 44240

Marietta College Marietta 45750

Miami University, College of Arts and Sciences Oxford 45056

Ohio University Athens 45701

Otterbein College Westerville 43081

Wittenberg University Springfield 45501

Youngstown University Youngstown 44503

Oregon

Reed College Portland 97202
Willamette University, College of Liberal Arts Saleb 97301

Pennsylvania

Albright College Reading 19604
Elizabethtown College Elizabethtown 17022
Franklin and Marshall College Lancaster 17603
Gettysburg College Gettysburg 17325
Juniata College Huntingdon 16653
Lebanon Valley College Annville 17003
Lycoming College Williamsport 17704
Moravian College Bethlehem 18018
Muhlenberg College Allentown 18104
Thiel College Greenville 16125

South Carolina

Furman University Greenville 29613
Newberry College Newberry 29108
Wofford College Spartanburg 29301

Tennessee

Carson-Newman College Jefferson City 37760
Chattanooga, University of, College of Liberal Arts Chattanooga
37403
East Tennessee State University Johnson City 37602
Lincoln Memorial University Harrogate 37752
Tennessee Wesleyan College Athens 37303
Tusculum College Greenville 37743

Texas

Baylor University, College of Arts and Sciences Waco 76706

Virginia

Bridgewater College Bridgewater 22812
Randolph-Macon College Ashland 23005
Richmond, University of, Richmond College Richmond 23173
William and Mary, College of Williamsburg 23185

West Virginia

Davis and Elkins College Elkins 26241
Marshall University Huntington 25701
West Virginia Wesleyan College Buckhannon 26201

Wisconsin

Beloit College Beloit 53512

Installation of sensors for a study of the radiation balance of a pine plantation.



Admission

Master of Forestry Degree

The admission requirements of the School of Forestry for work toward the Master of Forestry degree presuppose that an applicant is either:

1. a graduate of a professional school of forestry, or
2. a graduate of a college or university of high standing, but without prior professional training in forestry, or
3. a student who has successfully completed three years of approved study at one of the colleges (listed on pages 15-18) cooperating with the School in the academic-forestry training program.

Each applicant must present a certified transcript of his academic record showing the courses he has taken, the number of credit hours earned, and the grades received. Although specific courses are not required for admission, applicants must be aware that many fields within forestry require academic preparation of a specialized nature. Deficiencies, if any, may be satisfied in residence, possibly prolonging the time necessary to complete degree requirements. Students interested in specialized areas of forestry should write the dean for advice as to specific preparatory courses.

An applicant who is a graduate of a professional school of forestry will present a certified transcript of his scholastic record. Before registering for the first semester of residence, students will be required to select the

branch or branches of forestry in which they wish to concentrate the major part of their work and to prepare their proposed programs in conference with an appropriate faculty advisory committee. Ordinarily, graduates of a fully accredited school of forestry should be able to meet all requirements for the Master of Forestry degree in one full school year of resident study; others may require a longer period of residence.

Doctor of Forestry Degree

Admission to the School of Forestry for a program of study and research leading to the degree, Doctor of Forestry, is granted to a student who has received the degree, Master of Forestry, or its equivalent.

An applicant must file a formal application for admission together with transcripts of his undergraduate and graduate academic records. In his application he should clearly state the branch of forestry in which he desires to concentrate, and if possible, the specific research.

The director of admissions of the School of Forestry, together with the prospective student's major advisor, will determine if the qualifications of the applicant meet entrance requirements.

Master of Science and Doctor of Philosophy Degrees

Applications for admission into M.S. and Ph.D. programs in Forestry should be submitted to the director of admissions, Duke School of Forestry, for transmittal to the Office of the Dean of the Graduate School.

A student seeking admission to the Graduate School of Duke University must have received an A.B. or B.S. degree (or the equivalent in the case of foreign students) from an accredited institution. His undergraduate program should be well rounded and of such quality as to give positive evidence of the capacity for graduate study.

University Registration and Regulations

Registration

All students who enter course work or residence for credit; all students who have completed minimum requirements for an advanced degree, but continue to use the facilities of the University in their research; all students in *in absentia* status; and all students who wish merely to audit a course or courses must register.

After the applicant has received notification of his admission to the School of Forestry and has returned his statement of acceptance of admission, he may present himself for registration. During the registration periods, announced in this *Bulletin*, he first confers with an assigned faculty advisor who prepares and signs a course card, listing the course work to be taken during the semester. The student then presents this course card to registration officials, who enroll him officially in his courses. After his first registration period as a current student he will pre-register at the stated times for preregistration. Failure to preregister incurs the penalty for late registration. Former students who intend to register to resume a degree program must give the director of admissions notice of this intention two months before registration. A period of five weeks from the date of registration is provided for changes resulting from passing a preliminary examination.

Late Registration

All students are expected to register or preregister at the times stated in this *Bulletin*. Those registering late, including those who are obliged to register *in absentia*, are subject to a late registration fee of \$10.00.

Change of Registration

During the academic year within a period of fourteen days from the registration date a student may change registration with the approval of his adviser, if no reduction of fee is involved, and with the approval of the dean if reduction of fee is involved. During the first thirty days from the registration date the only permissible change is dropping course-seminar registration and adding equivalent units of research, with the approval of his adviser, the instructor of the course, and the dean.

Normal Registration

A graduate student is designated as fully registered when he registers for the maximum credit his program requires. Required registration is set in consideration of the student's obligation to teach or assist and the stage he has reached in completion of degree requirements. In the academic year normal registration for the resident student who does not hold an appointment as part-time instructor or assistant or does not engage in part-time work is fifteen units a semester or thirty units an academic year. The normal registration for the student who holds such an appointment or undertakes such work is either twelve units or a minimum of nine units depending upon the number of hours a week he is required to devote to such duties.

The resident student in a terminal master's program which requires no thesis carries normal registration until he has met all degree requirements. If a thesis is required and the student has met all requirements except for submitting his thesis, he registers for three units a semester while in residence or, if he elects to go out of residence, for 1 unit *in absentia* each semester until the thesis is accepted.

The resident student engaged in a master's program which is not terminal but preparatory to a doctoral program registers as though he were a doctoral student.

The resident student in a doctoral program carries normal registration through the semester in which he passes the preliminary examination. If he remains in residence, he continues to register for a minimum of 3 units a semester until the dissertation is accepted. If, before or after passing the preliminary examination, he elects to go out of residence, he registers for 1 unit a semester *in absentia* in order to keep his program active.

It is necessary to be a fully registered student according to the regulations listed above (except when registered *in absentia*) in order to establish eligibility for library carrel and laboratory space, for student hous-

ing, for University and some outside loans, for Student Health service including voluntary insurance coverage, and for reporting status for military duty.

The registration of one unit a semester *in absentia* provides occasional consultation with the thesis or dissertation supervisor. It may be waived for military duty or serious problems of health.

In the *Summer Session* six units a term is maximum registration. Students resident in the academic year who wish to continue study and use of University facilities including Summer Session Student Health during the summer must register for one unit in the first Summer Session term. This registration provides use of these facilities for both terms.

Transfer of Graduate Credits

Credit for graduate course work earned at another institution will be determined only after a student has spent one semester at Duke University. After completing his first semester, the student through his director of Graduate Studies should file a request that his credits be reviewed and a decision be made.

Reciprocal Agreements with the Consolidated University of North Carolina and North Carolina Central University

Under a plan of cooperation between the Consolidated University of North Carolina and Duke University, students regularly enrolled in the Graduate Schools of the University of North Carolina during the regular academic year, and paying full fees to that institution, may be admitted to a maximum of two courses per semester in the Graduate School of Duke University upon payment of a nominal registration fee of two dollars and of any other special fees regularly required of all students. Under the same arrangements, students in Forestry and the Graduate Schools of Duke University may be admitted to course work at the University of North Carolina and North Carolina State University. A similar arrangement exists with North Carolina Central University at Durham.

Grades

Grades in the School of Forestry are as follows: *E* (exceptional) *G* (good); *S* (satisfactory); *F* (failing); and *I* (incomplete).

An *I* (incomplete) indicates that some portion of the student's work is lacking, *for an acceptable reason*, at the time grades are reported. The instructor who gives an *I* for a course specifies the date at which the student must have made up the deficiency, in no case more than one calendar year from the date the course ended. If the course is not completed, the grade of *F* is entered upon the student's record unless his appeal to the dean for the grade *No Credit* is approved.

A grade of *F* in any course normally occasions withdrawal from a degree program.

Resources for Study

General and Research Facilities

The School of Forestry is housed in the south wing of the Biological Sciences Building on the West Campus. General and research laboratories are provided for routine and original studies in all of the subject matter fields. These laboratories are equipped with instruments and facilities for quantitative evaluation of biological materials and processes. Greenhouses and the phytotron immediately adjacent to the Biological Sciences Building and the nearby Duke Forest offer excellent facilities for biological investigations in controlled and natural environments. An IBM system 360 Model 75 Digital Computer is available for processing research data via a teletype terminal at the School.

Facilities of allied departments of the University are also available for advanced work in chemistry, economics, genetics, mathematics, plant anatomy, plant ecology, plant pathology, and plant physiology.

West Virginia Pulp and Paper Company has made available to Duke University a field headquarters for work in the forests of the South Atlantic Coastal Plain. This camp, located 18 miles northwest of Summerville, South Carolina, is used as a base for field instruction in timber harvesting, wood utilization, soils, silviculture, and forest management.

The School periodically sponsors conferences and symposia on industrial forest management and other technical and scientific subjects. These

offer the current viewpoints of many outstanding individuals in both forestry and in allied fields.

The University library, with 2,000,000 volumes and 4,000,000 manuscripts, provides exceptional resources and facilities for study and research by undergraduate and graduate students, and by visiting scholars. About 80,000 volumes are added annually, and 164 foreign and domestic newspapers and 9,800 periodicals are received currently. Large collections of microfilms of rare books, newspapers, and periodicals are also available.

The Biology-Forestry library, Chemistry library, and Physics-Mathematics library are housed for convenience in the buildings of these departments. The libraries of the Schools of Divinity, Law, Medicine, and Engineering are also housed in the buildings of these schools, all on the West Campus. The Woman's College Library on East Campus includes another 171,000 volumes.

The Duke Forest

The Duke Forest, of approximately 8,000 acres, is particularly well situated for field work. A five-minute walk from the campus will take one well into many parts of the area, and even the most distant portions can be reached by automobile in about twenty minutes.

At few other places in America are there provisions for extensive field study and research in forestry literally at the door of a large university. This natural outdoor laboratory, so conveniently located and representative of the region, is a most valuable supplement to the instructional, laboratory, and library facilities of Duke University.

The Forest lies mainly in Durham and Orange Counties near the eastern edge of the Piedmont Plateau. A cross-section of much of the woodlands in the upper coastal plain and lower Piedmont of the Southeast is represented in the Forest with its variety of topography, soil, forest conditions, and patterns of past land use. Elevations range from 280 to 760 feet. The soils are derived from such diverse parent material as metamorphic rock of the Carolina slate formation, granite, Triassic sedimentary rock, and basic intrusives. Nearly one hundred tree species are represented. Some eighteen miles of improved woods roads make all parts of these woodlands readily accessible. It serves as an outdoor laboratory for instruction in forestry and allied fields, and as an experimental forest for research in problems of timber growing and in the sciences basic thereto. It is also used to demonstrate methods of silviculture and forest management applicable to the region.

Forestry Sciences Laboratory

The establishment of the Forestry Sciences Laboratory of the United States Forest Service's Southeastern Forest Experiment Station in the Re-

search Triangle Park near Durham provides an unusual opportunity for complementing the research programs of students in the School of Forestry. Specialized research projects in forest entomology, pathology, and soils are currently under way at the Laboratory. The research staff of the Laboratory is available for consultation, participation in seminars, and service on graduate committees of students in the School of Forestry. Arrangements may also be made for students to conduct certain aspects of their research at the Laboratory.

Phytotron

A controlled environment plant growth facility adjoins the Biological Sciences Building. The Duke phytotron contains fifty separately controlled environmental areas. In the chambers and greenhouses it is possible to dissect or reproduce any total environment in the world. Using this procedure, one can study the influence of many environmental factors on the growth processes of trees. The chambers accommodate trees up to six feet tall, the greenhouses even larger plants.

The Duke phytotron is one of three such laboratories in the United States.

Guests examine some of the plants grown in the Duke phytotron.



Student Life

Living Accommodations*

Duke University strives to provide comfortable, attractive living accommodations for graduate-level resident students, both married and unmarried.

The Graduate Center houses 197 male graduate students, 56 women graduate students, and 117 women undergraduates. Common facilities on the main floor are shared by men and women.

Room reservations are made through the Office of Housing Management only after official acceptance for admission to the University.

Rooms in residence halls are normally rented for the academic year, but for no period less than one semester or specific term.

Duke University has 98 one-bedroom luxury apartments under lease for a period of three years. All units are within walking distance of the campus. Detailed information and rental rates will be provided on request to applicants by the Director of Housing Management, Duke University, Duke Station, Durham, N. C. 27706.

A deposit of \$25 is required with applications for residence halls or apartment units. The conditions for refund of the deposits will be provided at the time housing information is sent to each applicant.

* Information pertaining to graduate housing facilities is subject to change prior to September, 1970.

For the cost of housing at Duke, see the chapter on Financial Information.

Dining Service

The dining facilities on the West Campus include two cafeterias with multiple-choice menus, a snack bar, and the Oak Room where full meals and *a la carte* items are served. In the Graduate Center there is a cafeteria with multiple-choice menus and a coffee lounge where sodas and sandwiches are served.

Due to the large number served in the dining halls, it is not possible to arrange special diets for individual students. Special diets for the sick are served in the infirmary.

Services Available

Medical Care

The complete medical facilities of the Duke University Medical Center are available to all members of the University community. To secure the benefits of the Student Health program, a graduate student during the term or semester in which the illness occurs must (1) in the Summer Session term be registered for at least 1 unit research or 3 units of course work, (2) prior to completing minimum residence requirements be registered for at least 9 units per semester. Students are not covered during vacations and their dependents and members of their family are not covered at any time. Care is provided for men at the Student Health Office in Duke Hospital and for women at the Woman's College Infirmary.

The service provided includes hospitalization in Duke Hospital, when recommended by the Hospital staff, to a limit of thirty days; medical and surgical care under the supervision of a senior physician or surgeon; drugs, X-ray work, and ward nursing. Students pay for board while in the hospital. Excluded from the service are refraction of eyes, treatment of teeth, and of all chronic and pre-existing conditions, and elective surgery.

Students are urged to carry adequate health insurance to supplement Student Health Program services. If students have insurance providing hospitalization, surgical, or medical benefits, the benefit shall be applied to the cost of their medical care. *Foreign students are required to hold this or another acceptable policy.*

Student Activities

Forestry students new to Duke University are reminded that they are

welcome to use such recreational facilities as swimming pools, tennis courts, golf course, and to affiliate with choral, instrumental, drama, and religious groups.

Students are encouraged to maintain broad professional contacts by participation in the activities of the Society of American Foresters, the Forest Products Research Society, the national honorary scientific society of Sigma Xi, and other societies appropriate to their major field of study.

The social and business events of the Forestry Club provide opportunities for many pleasant extracurricular activities. An active organization of the wives of forestry students, the Forestry Dames, offers a regular schedule for social occasions of interest to this group.

The Duke University Counseling Center

Through the counseling center, the University provides a professional counseling service designed to aid students in gaining a better understanding of themselves and the opportunities available to them. Counseling is available in the areas of career planning, educational opportunities, and personal and social adjustment.

The Center maintains files of educational and vocational information related to career planning, graduate educational programs and fellowships, and study aids.

National and University-wide testing programs are administered by the Center. A continuing program of research in the areas of counseling and testing is also carried on by the staff of the Center.

Office of Placement Services

Duke University maintains an Office of Placement Services which acts as a liaison between the University and potential employers in business, education, and government. All services are offered without charge to Duke students and alumni. The staff is available to talk with students about their future professional plans. Forestry students who wish to register with the office are offered an opportunity to assemble a complete dossier of academic records and recommendations to supplement applications for positions and to have a permanent file for future reference. Pertinent recommendations are far easier to accumulate during the time a student is enrolled at Duke. Interviews with representatives visiting Duke are scheduled throughout the year through the Placement Office for those students who have registered. Copies of academic records are released only with the permission of the individual.

Conduct of Students

Duke University expects and will require of all its students continuing

loyal cooperation in developing and maintaining high standards of scholarship and conduct.

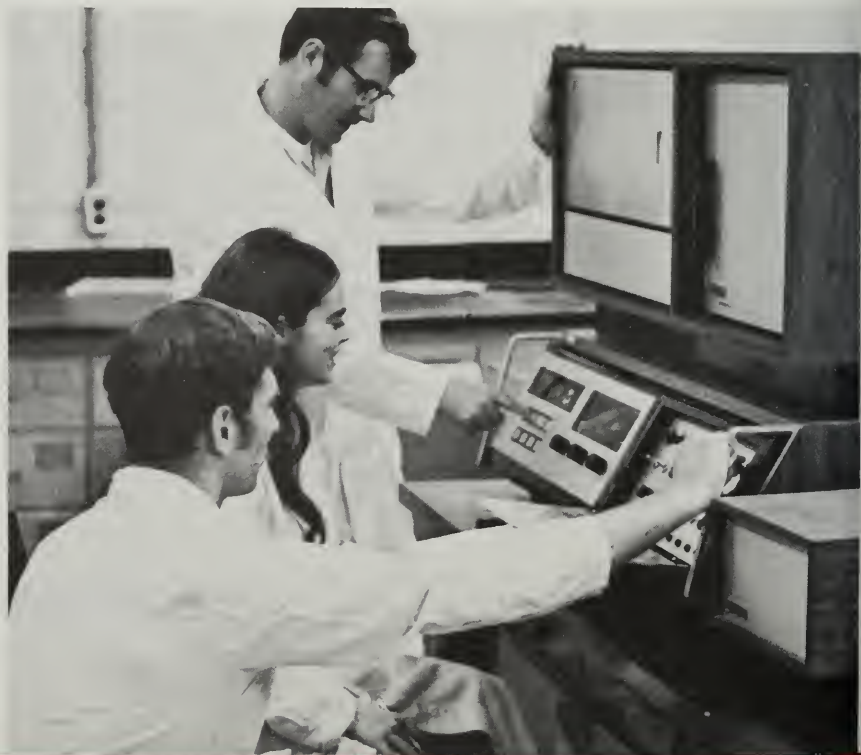
The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University as are currently in effect or, from time to time, are put into effect by the appropriate authorities of the University.

Any student, in accepting admission, indicates his willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate, for failure to abide by such rules and regulations, or for conduct adjudged unsatisfactory or detrimental to the University.

Visiting Scholars

The libraries and, to the extent practicable, other facilities of Duke University will be made available to faculty members of colleges and universities who wish to spend a period of time on the campus in pursuit of their scholarly interests. No fees will be charged such visitors unless they wish to participate in activities for which a special fee is assessed. Room and board may be arranged for at the regular rates in the dormitories and dining rooms. Dormitory space is usually available during the summer months. Inquiries concerning residence for visiting scholars should be directed to the dean of the Graduate School.

Forest biochemistry students are shown operating the automatic Beta counter in the radioisotope laboratory.



Financial Information

The following table shows the charges collected from all students. All charges for each semester are due and payable, unless otherwise specified, at the time of registration and no student is admitted to classes until arrangements have been made with the Bursar of the University for the settlement of such charges. After the day of registration no refund of tuition will be made except for involuntary withdrawal to enter the armed services.

Tuition and Fees*

Tuition, per semester	\$855.00
Spring field seminars	\$ 10.00
Absentia Fee, per semester (when applicable) . . .	\$ 57.00

Forestry students may obtain admission to all regularly scheduled University athletic contests held on the University grounds during the entire academic year by payment of an athletic fee of \$25.00 per year plus any Federal taxes that may be imposed. This fee is payable in the fall semester.

Audit Fee

If a student registers and pays fees for 12 units or more he may audit one course without charge. Should he be permitted to audit a second

* Although these fees are based upon existing charges, they are subject to change.

course or should he be registered for less than 12 units the audit fee is \$30.00 per course.

Transcripts

A student may request transcripts of his academic record. A minimum fee of one dollar, payable in advance, is charged for a single copy. A charge of \$.50 will be made for each additional copy on the same order.

Living Accommodations

Housing

Rooms in the Graduate Center are equipped for two persons. The rental charge for a double room is \$650.00 for the academic year, or \$325.00 for each occupant, or \$162.50 per occupant for each semester. Rooms are rented for the academic year, but for no period of less than one semester.

All requests for rates and other information for apartment-type accommodations should be addressed to the Director of Housing Management, Duke University. Specific information will be supplied as available.

Housing for women students in the graduate women's facilities is available at comparable rates.

No refund of room rent will be made except for involuntary withdrawal to enter the armed services. Such refunds will be made in accordance with the University's established schedules.

Dining Service

The cost of the dining facilities discussed on page 28 will approximate \$600.00, depending on the tastes of the individual.

Motor Vehicles

Each student possessing or maintaining a motor vehicle at Duke University shall register it annually at the beginning of the fall semester. If a student acquires a motor vehicle and maintains it at Duke University after enrollment, he must immediately register it. At the time of registration of a motor vehicle the following documents must be presented:

- a. State vehicle registration certificate.
- b. Valid driver's license.
- c. Satisfactory evidence of automobile liability insurance coverage with limits of at least \$10,000 per person and \$20,000 per accident for personal injuries, and \$5,000 for property damage, as required by the North Carolina Motor Vehicle Law.

d. If the student is under 21, a statement signed by the student's parent or guardian granting the student permission to operate a motor vehicle at Duke University.

There is a registration fee of thirty dollars per year for each automobile operated on the campus by students who live on the campus. There is a similar fee of ten dollars for the registration of two-wheeled motor vehicles.

Estimated Expenses for an Academic Year

The following table represents an estimate of a graduate student's basic expenses in the School of Forestry for one year. It should be noted, however, that this estimate does not include any allowance for travel, clothing, and other miscellaneous expenses inasmuch as these costs will vary depending on the needs, habits, and tastes of the individual.

	<i>Low</i>	<i>Moderate</i>	<i>Liberal</i>
Tuition	\$1,710.00	\$1,710.00	\$1,710.00
Room-rent*	325.00	325.00	420.00
Board	550.00	600.00	650.00
Laundry	30.00	40.00	50.00
Books	50.00	65.00	100.00
Athletic Fee (optional)	25.00	25.00	25.00
Spring field seminars	10.00	10.00	10.00
	<u>\$2,700.00</u>	<u>\$2,775.00</u>	<u>\$2,965.00</u>

* In the Graduate Center.

Student Aid

Fellowships, Scholarships, and Assistantships

A number of fellowships, scholarships, and assistantships are allocated to the School of Forestry for the encouragement and financial assistance of men and women who offer promise of becoming leaders in the forestry profession. These are awarded to applicants of high character on the basis of scholastic ability as judged by previous educational performance, professional experience, personal references and the Graduate Record Examination.

Holders of the awards will pay tuition and such additional fees as are regularly required.

The awards are of three classes:

Fellowships

Stipends range from \$2,300-\$4,000 per academic year. Each recipient must have previously completed work equivalent to that required at

Duke University for a master's degree with a major in forestry or in a discipline basic to forestry. He will devote his time to an approved program of study and research in any of the branches of forestry. He is expected to become a candidate for the degree of Doctor of Forestry or Doctor of Philosophy.

Scholarships

Stipends range from \$1,700-\$2,800 per academic year. Each recipient will normally devote his time to an approved program of study leading to the degree of Master of Forestry, or Master of Science with a major in forestry.

Graduate Assistantships

Graduate assistantships have variable stipends up to \$4000, depending upon available funds and upon whether granted for the academic year only, or the academic year plus the summer. Each recipient will devote half-time to research or other work of the School of Forestry. He will be permitted to enroll for not more than twenty semester hours in an academic year in an approved program of study, or study and research.

Application for Awards

Any student admitted to the School of Forestry is eligible to apply for a fellowship, a scholarship or an assistantship. Application for these awards may be made concurrently with the application for admission.

The general procedures and requirements for applying for any financial award in the School of Forestry are outlined below. Applicants should initiate the necessary action early to insure that the required documents are filed with the dean of the School of Forestry on or before March 1 prior to enrollment.

1. File award application. Form will be supplied by the School of Forestry on request.
2. Furnish supporting documents as follows:
 - a. Official transcripts of record of all previous college or university credits earned.
 - b. Letters of reference from at least three persons familiar with the applicant's character, scholarship, and professional ability.
(Documents offered in support of admission, if so designated, may also serve in support of the application for financial award.)
3. Complete the Aptitude Test of the Graduate Record Examination. Instructions and application for admission to this locally administered examination are available on most college campuses, from the Duke School of Forestry, or by writing the Educational Testing Service, Princeton, New Jersey. Applicants should plan to take this examination in January or earlier.

Notification of awards is made on April 1. In case vacancies occur, completed applications received after March 1 will be considered at a later date.

In every instance where a graduate assistantship, scholarship, or fellowship for the next academic year is offered to an actual or prospective graduate student and accepted before April 15, the recipient may resign his appointment without prejudice prior to that date by notification in writing to the dean. However, an acceptance given or left in force after April 15 obligates him not to accept another appointment without first obtaining formal release from the dean of the School.

Loans

Students who are enrolled as full-time degree candidates and who have satisfactory academic and citizenship records are eligible to apply for student loans.

Loans from university funds generally mature after borrowers have left the University. Interest accrues on long-term loans from University funds at the rate of one percent per annum from the date of each note. After a student has left the University permanently, the loans begin accruing interest at the rate of three percent per annum for a period of five years. Interest accrues at the rate of six percent after the three percent ceases to be effective.

In addition to local loan funds, Duke University participates in the student loan program established under the provisions of the National Defense Education Act of 1958. Repayment of these loan funds normally begins one year after the student terminates full-time study. Interest accrues at the rate of three percent per annum commencing one year after termination of full-time study. Upon completion of the period of grace of twelve consecutive months, the ten-year annual repayment period begins, and simple interest on the loan at the rate of three percent starts to accrue. At this point the borrower still has one additional year before his first annual payment becomes due. The first annual installment will therefore fall due twenty-four months after the borrower has ceased being a full-time student.

Special benefits to those teaching in non-profit schools, colleges, and universities permit a portion of the loan to be cancelled depending upon the length of teaching service.

Applications and complete details regarding the student loan program may be obtained by writing to the Student Loan Division of Duke University. In approving loan applications, the Student Loan Committee selects those students who, from the standpoint of character, scholastic attainment, personality and degree of financial need, are deserving of this consideration. All applications for loans should be made before July 1 preceding the academic year in which the student plans to matriculate.

Courses of Instruction

General

152. *Conserving Natural Resources.* Fundamentals of natural resource development, use, management and protection based on principles of the natural and social sciences. 3 units. *Staff*

200. *Careers in Natural Resources.* A weekly seminar which surveys the research and managerial career opportunities in all fields of renewable natural resources. Required of students in Academic-Forestry program. No credit. *Staff*

Forest Biology

Dendrology and Wood Anatomy

241. *Dendrology.* Nomenclature, classification, and identification of woody plants with special reference to the tree species indigenous to southeastern United States and other important forest regions of temperate North America. Prerequisites: Biology 1-2 or equivalent. 3 units. *Harrar and White*

290. *Wood Anatomy.* Study of the physical features and the gross and minute structural characteristics of wood leading to the identification of the commercial woods of the United States, and the important tropical woods used in American wood-working industries. Elementary micro-

technique. Prerequisites: one year of biology, Forestry 241 or equivalent. 3 units. *Harrar*

292. Microtechnique of Woody Tissue. Preparation of wood for microscopic study including sectioning, staining, and mounting techniques; elementary photomicrography. Prerequisites: Forestry 249 and 290 or equivalents. 3 units. *Harrar*

398. Timbers of the World. A study of the properties of various groups of tropical and temperate zone woods with particular emphasis upon those used in marine construction, and for lumber, plywood, decorative paneling and furniture. Prerequisite: Forestry 290 or equivalent. 2 units. *Harrar*

* Related courses in other departments include—*Botany*: Anatomy, Systematics, Physiology; *Chemistry*: Organic Chemistry; *Civil Engineering*: Mechanical Behavior of Materials.

Ecology

243. Forest Ecology. Ecological foundations of silviculture with special reference to forest site factors; influence of forests on their environment; growth and development of trees and stands; origin, development, and classification of forest communities; methods of studying forest environments. Prerequisites: plant physiology, plant ecology, and Forestry 261, or equivalents. 3 units. *Staff*

247. Biological Nucleonics. Fundamentals of nucleonics; instruction in biological uses of radioactive tracers, in counting instruments and measurements, and in legal requirements. Prerequisites: consent of the instructor and one year each of college biology, chemistry, and physics. (Listed also as Zoology 247.) 3 units. *Fluke (Zoology)*

347, 348. Forest Ecology Seminar. Advanced topics in forest ecology are discussed and current research papers and reports are reviewed, analyzed, and evaluated. Prerequisite: Forestry 243 or equivalent. 2 units. *Staff*

* Related courses in other departments include—*Botany*: Ecology, Plant Water Relations, Community Analysis and Classification, Principles of Plant Distribution, The Environment, Vegetation of North America, Evolution; *Zoology*: Animal Behavior, Vertebrate Zoology.

Physiology and Biochemistry

201. Tree Physiology. A general survey of the major physiological processes in trees and other plants, including food synthesis, growth and water relations. Special project and term paper required. Lectures, laboratories and readings. Prerequisite: permission of instructor. (Listed also as Botany 251.) 3 units. *Hellmers*

207. Chemistry of Woody Tissues. Composition of wood at the ele-

mental, molecular, and macromolecular levels; both in woody plants and in processed woods. Distribution and properties of main components, and methods of analysis. Prerequisite: organic chemistry or consent of instructor. 3 units. *Barnes*

208. *Physiology of Wood Formation.* Processes involved in the growth and development of woody tissues, including internal control mechanisms and effects of environmental stresses on structure and composition. Prerequisite: Forestry 201 and 249 or equivalents. 3 units. *Barnes*

305. *Forest Tree Biochemistry.* Study of the biological synthesis, function, and degradation of the main biochemical constituents of trees. Emphasis on cellulose and other cell-wall polysaccharides, lignins, terpenes and phenolics and other extractives. Prerequisites: Forestry 201 and a course in biochemistry. 3 units. *Barnes*

* Related courses in other departments include—*Botany*: Anatomy, Plant Metabolism, Plant Water Relations, Physiology of Growth and Development; *Biochemistry*: Introductory Biochemistry, Chemistry of Natural Products; *Chemistry*: Organic Chemistry, Chemical Instrumentation.

Pathology

222. *Biology of Forest Insects and Diseases.* Fundamentals of entomology and plant pathology as applied to forest protection; coordinated laboratory work with emphasis on identification and interpretation of forest and wood degradation. 4 units. *Anderson and Stambaugh*

223. *Forest Pathology.* Infectious and non-infectious diseases of forest trees, and related deterioration of forest products. Field and laboratory study of symptoms, etiology, and control. Prerequisites: Botany 1 and 2 or equivalent. 3 units. *Stambaugh*

321. *Phytopathological Technique in Forestry.* Fundamentals of phytopathology and their application to field and laboratory investigations of tree diseases and wood degradation; biological interpretation of host pathogen-environment interaction is stressed in literature review, experimentation, and scientific writing. Prerequisite: Forestry 223 or equivalent. 4 units. *Stambaugh*

322. *Microbiology of Forest Soils.* Qualitative and quantitative characterization of the microbial populations of forest soils with emphasis on rhizosphere interactions in root pathogenesis and mycorrhizal development; epidemiology of root diseases of trees; principles of control. Prerequisites: Forestry 223, and mycology or bacteriology is recommended. 3 units. *Stambaugh*

385. *Seminar in Forest Protection.* Discussion of current problems in entomology and pathology and evaluation of topical research for protection and control application in forest resource management. Prerequisites: Forestry 223 and 230. 1 unit. *Anderson and Stambaugh*

* Related courses in other departments include—*Botany*: Mycology, Plant Water Relations, Physiology of Growth and Development, Cytology, Genetics; *Chemistry*: Organic Chemistry; *Zoology*: Biological Nucleonics; *Biochemistry*: Introductory Biochemistry.

Entomology

222. Biology of Forest Insects and Diseases. (See description under Pathology above.)

230. Forest Entomology. Identification, biology and control of insects that cause damage to trees and wood products. Emphasis of diagnosis is on the characteristics of the damage and the stages of the insects responsible. Prerequisite: Forestry 222 or equivalent or consent of instructor. 3 units. *Anderson*

233. General Entomology. Principles of morphology, physiology, metamorphosis, and taxonomy of insects. Prerequisites: one course in entomology or zoology or consent of the instructor. 4 units. *Anderson*

331. Toxicology of Insecticides. Study of the physical, chemical and biological properties of materials used to destroy insects. Formulation, toxicology and insect physiology as related to insecticide action are emphasized. Prerequisite: one course in entomology; organic chemistry is recommended. 3 units. *Anderson*

332. Ecology of Forest Insects. The influence of environmental factors on the vital processes of insects with emphasis on how both the abiotic and biotic elements influence the fluctuation of forest insect populations. Prerequisite: one course in entomology or zoology or consent of the instructor. 3 units, 4 units with laboratory. *Anderson*

335. Entomological Research Techniques. Problem analyses, scientific writing, and laboratory and field research methods which are especially applicable to entomological problems. 1 unit. *Anderson*

385. Seminar in Forest Protection. (See description under Pathology above).

* Related courses in other departments include—*Zoology*: Ecology, Systematic Zoology, Radiation Biology, Biological Nucleonics, Cellular Physiology, Invertebrate Embryology, Genetics; *Chemistry*: Organic Chemistry; *Biochemistry*: Introductory Biochemistry; *Botany*: Bacteriology; *Microbiology and Immunology*: Microbiology.

Environmental Science

309, 310. Environmental Seminar. Discussion of advanced topics and current research in the physical and chemical processes of the natural environment (air, soil, and water). Emphasis is placed on the interaction between environmental processes and living organisms. Prerequisite: consent of instructor. 2 units. *Ralston and Knoerr*

Soils

261. Forest Soils. Origin, development, and classification of soils with special emphasis on those developed in humid climates; morphological, physical, and chemical properties of soils in relation to growth of trees; effect of forests on soils. Prerequisites: Chemistry 1 and 2, and Physics 1 or equivalents; physical geology, mineralogy, petrology, and analytical chemistry are also desirable. 3 units. *Ralston*

362. Forest Soil Physics. Analysis of the physical properties of soil related to the growth and development of forest trees. Consideration is given to the significance of soil moisture, temperature, aeration, and structural characteristics in the analysis of forest growth relationships. Prerequisite: Forestry 261. 3 units. (Not offered in 1970-71.) *Ralston*

364. Soil Classification and Mapping. Classification of soils as natural bodies. Mapping of soils, land use classes and forest site classes; field study will be made of soils in either the coastal plain or mountains. Prerequisite: Forestry 261. 3 units. *Ralston*

366. Forest Soil Fertility. The relationships of soil fertility factors in the growth of forest trees. Emphasis is placed on the analysis of soil factors related to the mineral nutrition of trees. Prerequisites: Forestry 261, with analytical chemistry recommended. 3 units. *Ralston*

* Related courses in other departments include—Botany: Plant Water Relations; Physiology of Growth and Development; *Biochemistry*: Introductory Biochemistry; Chemistry: Chemical Instrumentation, Elements of Theoretical Chemistry; *Geology*: Sedimentary Minerals.

Meteorology

203. General Meteorology. A general introduction to the science of meteorology, particularly for students concerned with problems in biology and hydrology. Emphasis is placed on the fundamentals and role of atmospheric thermodynamics and energy and mass transfer processes in determining both local and regional aspects of weather and climate. 3 units. *Knoerr*

304. Atmospheric Turbulence and Diffusion. Bulk and molecular aspects of atmospheric turbulence. Navier-Stokes equations and the Reynold's stresses. Mixing-length and statistical turbulence theories. Similarity hypotheses. Turbulent transfer and diffusion in adiabatic and diabatic atmospheres. Characteristics of turbulence in various scales of motion from the planetary to sub-inertial range. Prerequisites: Forestry 241 and differential equations or consent of instructor. 3 units. *Vukovich*

306. Dynamics of Local Atmospheric Motion. Characteristics of atmospheric motion in the 100 m to 100 km scale. Analytic development from hydrodynamic and thermodynamic equations, incorporating appropriate scale forcing functions of heating and terrain roughness. Theor-

and characteristics of land and sea breezes, mountain and valley breezes, mountain waves and local modification of large scale atmospheric motion. Prerequisites: Forestry 203 and differential equations, or consent of instructor. 3 units. (Not offered in 1970-71.) *Vukovich*

308. Topics in Biometeorology. The effect of meteorological processes on biological processes including: photosynthesis, respiration, gas diffusion, energy and water balance, seed dispersal, dissemination of pathogens, insect migration, and effects of atmospheric pollution. Prerequisites: Forestry 203 or equivalent and permission of instructor. 3 units. *Knoerr and Barnes*

344. Micrometeorology. Physics of the earth's surface environment with emphasis on plant and animal microclimates; budgets of mass, momentum and energy; vertical structure of wind, temperature, water vapor and carbon-dioxide in relation to exchange processes within the biosphere; local circulation and eddy diffusion; principles of micrometeorological measurement. Prerequisite: Forestry 203 or equivalent and calculus, 3 units. *Knoerr*

* Related courses in other departments include—*Mechanical Engineering*: Fluid Mechanics, Thermodynamics, Heat Transfer, Transport Phenomena, Boundary Layer Theory; *Mathematics*: Applied Mathematical Analysis, Numerical Analysis; *Chemistry*: Physical Chemistry, Chemical Instrumentation; *Botany*: Ecology, Plant Water Relations.

Hydrology

342. Hydrologic Processes. Physical processes of the hydrologic cycle with emphasis on those processes which can be modified or controlled by watershed management. 3 units. *Knoerr*

* Related courses in other departments include—*Civil Engineering*: Hydrology, Incompressible Fluid Flow, Mechanics of Fluids; *Mechanical Engineering*: Transport Chemistry: Physical Chemistry, Chemical Instrumentation; *Botany*: Ecology, Plant Water Relations.

Resource Economics and Management

Economics and Policy

269. Resource Economics and Policy. Development and critical review of concepts useful in understanding and evaluating the distribution of natural resource use over time in terms of the relations between technological knowledge, group and individual behavior, and social institutions. 3 units. *Slinn*

270. Economics of Forestry. Development of the principles of economics useful in the analysis of the past, present, and prospective supply and demand situations for forestry goods and services; problems of the

economics of the firm and industry, basic and peculiar to forestry, with special attention to the time dimensions of value; the role of forestry in the general economy including attention to relevant institutional factors. Prerequisite: at least one course in the principles of economics. 3 units. *Slinn*

378. Seminar in Forest Economics. Examination and discussion of the application of economic concepts in forestry, the potential contribution of economic analysis to private and public forest management; current research in forest economics. Prerequisites: Forestry 270 and 379 or consent of the instructor; advanced courses in economics and economic theory are desirable. 2 units. *Slinn*

379. Economic Analysis in Forestry. Principles of economics of particular value to problems of resource allocation and efficiency in private forest management based on a static and dynamic firm theory approach, linear programming and activity analysis. Development of production principles applicable to forestry problems in use of land, labor, and capital; resource and production combinations; production location and timing; cost structure and asset control; uncertainty and expectations. Special attention to problems in formulating economic projections and forecasts relevant to forestry. Prerequisite: Forestry 270 or consent of instructor. 3 units. *Slinn*

* Related courses in other departments include—*Economics*: Economic Theory, History and Systems; Economic Development, Planning and Fluctuations; Economic Statistics; Monetary and Fiscal Theory and Institutions; International Economics; Manpower, Labor and Population; Industrial Organization and Public Policy; *Business Administration*: Business Finance, Marketing and Accounting.

Management

244. Theory and Practice of Silviculture. Principles governing establishment, treatment, and control of forest stands; natural and artificial methods of reproduction, intermediate cuttings, and cultural operations with emphasis on the principle forest types of temperate North America. Field practice in silvicultural operations and study of managed stands. Prerequisite: Forestry 243 or equivalent. 3 units. *White*

248. Forest Regeneration. The fundamentals and application of forest tree improvement, nursery operations, and site improvement techniques to the regeneration of forest stands by artificial and natural means. 2 units. *Chaiken and White*

256. Forest Measurements. Application of plane surveying technique to the measurement of land area, topography and timber type; measurement of volume and growth of forest trees and stands; measurement of forest products. 4 units. *White*

281. Forest Management. Principles of organizing forest properties for systematic management, use of data obtained in surveys and inven-

tories; principles of forest regulation, including a study of normal and actual forests, rotations, cutting cycles, and methods of regulating the cut in even-aged and all-aged forests for sustained yield; introduction to the preparation of preliminary forest management plans. 3 units. *Chaiken*

283. *Fire Behavior and Use.* Impact of destructive agencies upon forests; principles of combustion, fire behavior, danger measurement and suppression; use of fire in forest management. 2 units. *Chaiken*

289. *Interpretation of Aerial Photographs.* Principles of aerial photography and remote sensing as applied to forest administration, vegetation mapping, forest mensuration, and insect and disease surveys. Co-requisite: Forestry 281 or equivalent. 3 units. *Chaiken*

382. *Legal Aspects of Forestry.* A seminar discussion of certain state and federal laws pertinent to the management of forests: land ownership, trespass, public liability, timber contracts, labor relations, use of pesticides. 1 unit. *Chaiken*

386. *Seminar in Forest Management.* Examination and analysis of techniques employed in the management of industrial and public forests, particularly in the South; discussion of problems of large scale intensive forest management. Prerequisites: Forestry 244, 281, and 379 or equivalent. 1 unit. *Chaiken*

* Related courses in other departments include—*Business Administration*: Theory of Firm, Organization Theory, Information Systems, The Firm in Society; *Political Science*: Public Administration; *Social Science*: Social Stratification, Industrial Sociology.

Statistics and Operations Research

210. *Analytical Techniques in Forest Utilization.* Introduction to utilization in the managed forest and principal wood-using industries and to operations analysis methods applied to scheduling and production problems in these industries. 3 units. *Yandle*

250. *Biometry.* Concepts and methods of statistics essential to the collection, analysis and interpretation of resource and biological data. Emphasis is placed on problems of estimation, inference, and decision making with experimental data. 3 units. *Yandle*

251. *Theory and methods for Sampling Biological Populations.* Introductions to statistical methods for sampling natural resources and biological populations. Simultaneous consideration is given to theoretical and experimental problems in the design and applications of sampling methods and in the interpretation of sample data. Prerequisite: Forestry 250 or consent of instructor. 3 units. *Yandle*

253. *Computer Science in Natural Resources.* Components and organization of a computer system; automatic programming languages; storage and retrieval systems (TSAR); equation fitting by iteration and least squares methods; graphical techniques. 1 unit. *Staff*

258. Operations Research. Mathematical model formulation and development of techniques to aid decision-making in problems of natural resource allocation and use. Includes the theory and techniques of inventory control, equipment replacement planning, queuing theory, competitive strategies, allocation, sequencing and dynamic programming. Consideration is given to both deterministic and nondeterministic models. 3 units. *Staff*

352. Theory and Applications of Linear Statistical Models. Theoretical development of the general linear statistical model together with extensions to accommodate linear approximation of non-linear cases. Curve fitting techniques are developed with emphasis on applications to natural phenomena. Consent of the instructor. 3 units. *Staff*

353. Design and Analysis of Experiments. Extension of the theory of estimation and testing for general linear models to include the less than full rank case. Experimental design models such as factorial and incomplete block models are developed as special cases of the general theory. Emphasis is placed on field and laboratory designs together with appropriate computerized analysis techniques. Prerequisite: Forestry 352. 3 units. *Staff*

* Related courses in other departments include—*Mathematics*: Calculus, Numerical Analysis, Complex Analysis, Non-parametric Statistics, Probability, Applied Mathematical Statistics, Stochastic Processes, Multivariate Statistics; *Economics*: Econometrics, Quantitative Analysis.

Special Studies and Research

299. Special Studies in Forestry. Work on the Senior-Graduate level to meet the needs of individual students offered in the areas of forestry and related natural resources designated under Forestry 357, 358. Credits and hours to be arranged. *Staff*

301, 302. Advanced Studies in Forestry. Work on the advanced Graduate level to meet the needs of individual students offered in the areas of forestry and related natural resources designated under Forestry 357, 358. Credits and hours to be arranged. *Staff*

357, 358. Research in Forestry. Students with adequate training may undertake special research problems under direction of members of the faculty in the following branches of forestry and related natural resources. Credits to be arranged.

1. *Forest Ecology.* Prerequisite: Forestry 243 or equivalent. *Staff*
2. *Forest Soils.* Prerequisite: Forestry 261 or equivalent. *Ralston*
3. *Silviculture.* Prerequisites: Forestry 243 and 244, or equivalents. *White*
4. *Forest Management.* Prerequisite: Forestry 281 or equivalent. *Chaiken*

5. *Forest Economics*. Prerequisite: Forestry 270 or equivalent. *Slinn*
 6. *Wood Anatomy and Properties*. Prerequisites: Forestry 249 and 290 or equivalents. *Harrar*
 7. *Forestry Mensuration and Biometry*. Prerequisites: Forestry 250 and 352 or equivalents. *Yandle*
 8. *Forest Entomology*. Prerequisite: Forestry 230 or equivalent. *Anderson*
 9. *Forest Operations Research*. Prerequisite: consent of instructor. *Yandle*
 10. *Dendrology*. Prerequisite: Forestry 249 or equivalent. *Harrar and White*
 11. *Forest-Tree Physiology*. Prerequisite: Plant physiology, plant or forest ecology. *Kramer, Hellmers, and Barnes*
 12. *Forest Pathology*. Prerequisites: Plant physiology and Forestry 223 or equivalents. *Stambaugh*
 13. *Forest Meteorology and Hydrology*. Prerequisites: Forestry 203, 342, or equivalents. *Knoerr*
 14. *Forest Biochemistry*. Prerequisites: Plant physiology, organic chemistry. *Barnes*
368. *Field Seminars*. Field studies, consultations and visits to areas of interest during spring vacation period, or at other times, in the several branches of forestry and related natural resources listed under Forestry 357, 358. Credits to be arranged. *Staff*

Enrollment 1970-71

Registered for the Master of Forestry Degree

All, John Norman (Indiana Central College). Terre Haute, Indiana
Anderson, Kenneth Lee (Kent State University). Rockford, Ohio.
Blakeslee, George M., Jr. (Albright College). Durham, North Carolina
Boardman, Spencer Douglas (Tennessee Wesleyan College). Norris, Tennessee
Bond, Jeffrey Forrest (B.S., West Virginia Wesleyan College). Arnold, Maryland
Brooks, Frank Overton, Jr. (B.S., University of Richmond). Tappahannock, Virginia
Bushman, David Howard (B.A., Gettysburg College). Ellwood City, Pennsylvania
Clark, Peter Bruce (Duke University). Dallas, Texas
Coman, James Hilary, II (Duke University). Hillsborough, North Carolina
Davis, James Brett (Thiel College). New Wilmington, Pennsylvania
Ellington, Robert Owen (Baylor University). Waco, Texas
Elliot, Ernest William (B.S., Albright College). Succasunna, New Jersey
Hagenmueller, Paul Otto, Jr. (B.S., University of Richmond). Richmond, Virginia
Heinsch, Robert Carl, Jr. (Juniata College). Saltsburg, Pennsylvania
Juttner, Adrian Stephen (B.S., University of Missouri). St. Louis, Missouri
Kempf, Robert Luitpold (B.S., Randolph-Macon College). Richmond, Virginia
Kraus, Charles Lee (College of William and Mary). Arlington, Virginia
Matuszewski, Mark Anthony (Butler University). Landing, New Jersey
Miller, James Benjamin (College of William and Mary). Vienna, Virginia
Mistretta, Paul Alessio (B.S., Fordham College). Park Ridge, New Jersey
Moser, Thomas Elmer, II (B.S., Duke University). Eleanor, West Virginia
Oddo, Alfred (B.S., Ohio University). Apapa Lagos, Nigeria
Schoenholz, James Allen (Heidelberg College). Sayville, New York
Simkins, Wayne Harvey (Davis and Elkins College). Wilmington Delaware
Somes, Horace Arthur, Jr. (Drew University). Pemberton, New Jersey

Registered for the Doctor of Forestry Degree

Douglass, Ross Swarens (B.S., North Carolina State University; M.F., Duke University). Raleigh, North Carolina
Haeruman, Herman (For. Eng., Institute of Agriculture Bogor; M. F., Duke University). Bogor, Indonesia
Lin, Jim Yung-haun (B.A., Taiwan; M.S., North Carolina State University). Taiwan
China
Swift, Lloyd Wesley, Jr. (B.S., New York State College of Forestry; M.S., North Carolina State University). Franklin, North Carolina

Students in the Department of Forestry in the Graduate School

- Armstrong, Frank Harris (B.S., West Virginia University; M.F., Yale University). South Burlington, Vermont
- Barreto, Louis Soares (Eng. Silvicultor, Instituto Superior de Agronomia-Lisbon; M.F., Duke University). Mozambique, Portuguese East Africa
- Boyer, William Davis (B.S., M.F., State University College of Forestry at Syracuse University). Brewton, Alabama
- Cole, Alexander Beryl (B.S., M.S., University of Missouri). Athens, West Virginia
- DeBell, Dean Shaffer (B.S., Juniata College; M.F., Duke University). Charleston, South Carolina
- Delp, Phil Gerard (B.S., M.S., Colorado State University). Fort Collins, Colorado
- Dickson, Robert Bedford Bennett (B.S., Acadia University). Nashwaaks, New Brunswick, Canada
- Dutrow, George Fewell (B.S., M.F., Duke University). Washington, D. C.
- Graham, William Alexander, II (A.B., J.D., University of North Carolina). Durham, North Carolina
- Ham, Donald Lee (B.A., William Jewell College; M.F., Duke University). East Peoria, Illinois
- Hudson, Carolyn Brauer (B.S., University of North Carolina). Chapel Hill, North Carolina
- McLaughlin, Samuel Brown, Jr. (B.S., Hampden-Sydney; M.S., Virginia Polytechnic Institute). Brownsburg, Virginia
- Meadows, John Crawford (B.S.F., Auburn University; M.S., Georgia Institute of Technology). Ames, Iowa
- Morgan, William Floyd, II (B.S., University of Illinois; M.F., Duke University). Normal, Illinois
- Mowbray, Robert Norman (A.B., Dartmouth College; M.F., Yale University). Baltimore, Maryland
- Mowry, Fred Lear (B.S., Syracuse University). Syracuse, New York
- Murphy, Charles Edward, Jr. (B.S., West Virginia Wesleyan; M.F., Duke University). Durham, North Carolina
- Orchard, Terence Joseph (B.Sc., London University). London, England
- Péché, Gyula (B.S.F., University of British Columbia; M.F., Yale University; M.Sc., University of Guelph. Ottawa, Ontario, Canada
- Romancier, Robert Marshall (B.S., University of Massachusetts; M.F., Yale University). Amherst, Massachusetts
- Shoulders, Eugene (B.S.F., West Virginia University; M.F., Louisiana State University). Pineville, Louisiana
- Sims, Herbert Percival (B.S.F., University of British Columbia; M.F., Yale University). Winnipeg, Manitoba, Canada
- Sites, William Horace (B.A., Catawba College; M.F., Duke University). Fayetteville, Pennsylvania
- Sterner, Thomas Elliott (B.S., West Virginia University; M.Sc.F., State University College of Forestry at Syracuse University). Fredericton, New Brunswick, Canada
- Stubbs, Jack (B.S., Michigan State University; M.F., University of Minnesota). Charleston, South Carolina
- Tabor, Getahun (B.S., Haile Selassie University). Addis Ababa, Ethiopia
- Tanaka, Yasuomi (B.A., Tokyo University; M.F., Duke University.) Sumiko, Japan
- van Kesteren, Frido (B.S., Pennsylvania State University; M.F., Duke University). The Hauge, Holland
- Watt, Alan James (B.S., University of Sydney; M.F., Duke University). Wyong, Australia
- Wilkinson, Thomas George (B.S., M.F., Duke University). Durham, North Carolina

Degrees Conferred 1968-1969

Master of Forestry

Boyles, Johnny Lavon
Delill, Victoria Donna
Ericksen, William Douglas
Evans, Larry Krinn
Gallegos, Carl Michael
Hain, Fred Paul
Harcharik, David Andrew
Heintzelman, Richard George

Jeffries, Jonathan
Lapointe, Gerald Bernard
McClure, Charles King, III
Polaski, Edward
Rankin, Dennis Campbell
Speer, Noah Quinten
Terry, Thomas Anthony

Doctor of Forestry

Gray, John Lewis (B.S.F., Pennsylvania State University; M.F., Yale University). Dissertation: "An Approach To The Development Of Normative Timber Supply Estimates For Non-Farm, Private Individual, Rural Forest Ownerships In The North Carolina Sandhills"

Doctor of Philosophy

Hay, Ronald Leroy (B.S., Southern Illinois University; M.F., Duke University). Dissertation: "Effects of Planting Deformation on Growth of Loblolly Pine Seedlings"

1970

	S	M	T	W	T	F	S		S	M	T	W	T	F	S
JAN.					1	2	3		JULY			1	2	3	4
	4	5	6	7	8	9	10			5	6	7	8	9	10
	11	12	13	14	15	16	17			12	13	14	15	16	17
	18	19	20	21	22	23	24			19	20	21	22	23	24
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FEB.	1	2	3	4	5	6	7		AUG.						1
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MAR.	1	2	3	4	5	6	7		SEP.		1	2	3	4	5
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	15	16	17	18	19	20	21			13	14	15	16	17	18
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APR.				1	2	3	4		OCT.				1	2	3
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	26	27	28	29	30					25	26	27	28	29	30
MAY					1	2			NOV.	1	2	3	4	5	6
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	31														
JUNE		1	2	3	4	5	6		DEC.		1	2	3	4	5
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	21	22	23	24	25	26	27			20	21	22	23	24	25
	28	29	30							27	28	29	30	31	

BULLETIN OF DUKE UNIVERSITY

Summer Session

1970



Annual Bulletins

- For *Bulletin of Information for Prospective Students*, apply to Office of Undergraduate Admissions, Duke University, Durham, N. C. 27706
- For *Bulletin of Undergraduate Instruction*, apply to the Registrar, Duke University, Durham, N. C. 27706
- For *Bulletin of the Graduate School*, apply to the Dean of the Graduate School, Duke University, Durham, N. C. 27706
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- For *Bulletin of Faculty Publications*, apply to the Office of the Vice Provost for Academic Administration, Duke University, Durham, N. C. 27706
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Cover design is adapted from a photograph of a carving in the entrance to Crowell Quadrangle.

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Summer Session
1970

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Calendar of the Summer Session, 1970

First Term: June 9-July 15

Second Term: July 17-August 22

June

- 8 Monday, 12:00 noon—Dormitories ready for occupancy
- 9 Tuesday—Registration for First Term
- 10 Wednesday—Instruction begins in all courses of the First Term except 4 s.h. or unit science courses
- 14-19 Sunday-Friday—Basketball Clinic
- 17 Wednesday—Instruction begins in 4 s.h. or unit courses of First Term in chemistry, geology, and physics
- 21-26 Sunday-Friday—Basketball Clinic
- 29 July 25 Monday-Saturday—medical mycology course

July

- 8 Wednesday—Examination for students electing English for a foreign language requirement; room and hours to be announced. Registration for the examination takes place in the Graduate School Office through July 1
- 14-15 Tuesday, Wednesday—Final examinations for First Term
- 16 Thursday—Students enrolled in Term I but not remaining for Term II must vacate dormitory rooms by 8:30 a.m.
- 16 Thursday—Students enrolled in Term II *only* may occupy dormitory rooms after 4:00 p.m.
- 17 Friday—Registration for Second Term courses, including science courses
- 20 Monday—Instruction begins in all Second Term courses

August

- 2- 7 Sunday-Friday—Basketball Clinic
- 3 Monday—Final date for filing with Graduate School Office the Statement of Intention to complete requirements for the mas-

ter's degree during the Summer Session. If a thesis is to be presented, the title is to be filed at the same time as the Statement of Intention

- 9-14 Sunday-Friday—Basketball Clinic
- 14 Friday—Last day for submitting theses for master's degrees
- 14 Friday—Examination in all 4 s.h. or unit courses of the Second Term in chemistry, geology, and physics
- 21-22 Friday, Saturday—Final examinations in all courses of the Second Term
- 22 Saturday—Final date for completion of requirements for Graduate School degrees to be awarded September 1



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Alan W. Jenks, Th.D., *Assistant Dean of Trinity College*

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Myrtle Irene Brown, R.N., Ph.D., *Dean of the School of Nursing*

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Dale B. J. Randall, Ph.D., *Assistant Dean of the Graduate School*

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John Costlow, Jr., Ph.D., *Director of Duke Marine Laboratory*

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Elizabeth Dix, M.A., *House Counselor for Graduate Women, First Term*

Bernadette Scott, A.B., *House Counselor for Graduate Women, Second Term*

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Howard Charles Wilkinson, D.D., *Chaplain to the University and Director of Religious Activity*

James Benjamin Smith, M.S.M., *Director of Chapel Music and Choral Music*

Walter Scott Persons, A.B., *Recreation Supervisor for the Summer Session*

Lawrence W. Smith, Jr., B.A., *Director of Housing Management*

The Summer Session Faculty

Alt, A. Tilo, Ph.D., *Assistant Professor of German*
Aquila, Richard, Ph.D., *Assistant Professor of Philosophy*
Barber, Richard, Ph.D., *Associate Professor of Zoology and Botany*
Bassett, Frank Houston, III, M.D., *Associate Professor of Anatomy*
Baxter, John, Ph.D., *Visiting Assistant Professor of Chemistry*
Bessent, Helga W., M.A., *Lecturer in German*
Bonk, James, Ph.D., *Associate Professor of Chemistry*
Bradley, David G., Ph.D., *Associate Professor of Religion*
Brewer, James, Ph.D., *Visiting Professor of History*
Bryan, Anne-Marie, M.A.T., *Assistant Professor of Romance Languages*
Cartwright, William H., Ph.D., *Professor of Education*
Cell, John W., A.B., *Assistant Professor of History*
Charlesworth, James H., Ph.D., *Assistant Professor of Religion*
Clark, Henry B., Ph.D., *Associate Professor of Religion*
Coie, John D., Ph.D., *Assistant Professor of Psychology*
Colton, Joel, Ph.D., *Professor of History*
Conant, Norman, Ph.D., *Professor of Microbiology*
Costanzo, Philip, Ph.D., *Assistant Professor of Psychology*
Cox, R. Merritt, M.A., *Assistant Professor of Romance Languages*
Cypress, Sandra, Ph.D., *Visiting Assistant Professor of Romance Languages*
Davies, David G., Ph.D., *Professor of Economics*
Davis, Otho L., M.A., *Assistant Professor of Physical Education*
DeNeef, Leigh, Ph.D., *Assistant Professor of English*
Duffey, Bernard I., Ph.D., *Professor of English*
Dunn, Patrick, Ph.D., *Visiting Assistant Professor of History*
Durden, Robert, Ph.D., *Professor of History*
Fein, John Morton, Ph.D., *Professor of Romance Languages*
Fenton, Stephen, M.A., *Instructor in Sociology*
Ferguson, Oliver, Ph.D., *Professor of English*
Fitzgerald, Thomas, M.A., *Visiting Lecturer in Anthropology*
Flowers, Anne, Ed.D., *Visiting Professor of Education*

Fong, Anne, M.A., *Instructor in Romance Languages*
 Frasure, Dorothy, M.A., *Instructor in Romance Languages*
 Fredericksen, James, Ph.D., *Visiting Professor of Chemistry*
 Gehman, Ila, Ed.D., *Associate Professor of Medical Psychology*
 Gehman, W. Scott, Jr., Ph.D., *Professor of Education*
 Githens, Sherwood, Jr., Ph.D., *Professor of Education*
 Gohdes, Clarence, Ph.D., *Professor of English*
 Havrilesky, Thomas, Ph.D., *Associate Professor of Economics*
 Heron, Stephen Duncan, Jr., Ph.D., *Associate Professor of Geology*
 Herr, David, Ph.D., *Assistant Professor of Mathematics*
 Hurlburt, Allan S., Ph.D., *Professor of Education*
 Jezierski, Bronislas de Leval, Ph.D., *Associate Professor of Slavic Languages and Literature*
 Johnson, Charles B., Ed.D., *Associate Professor of Education*
 Johnson, Joseph, Ed.D., *Associate Professor of Education*
 Jones, Buford, Ph.D., *Associate Professor of English*
 Joshi, Jayant G., Ph.D., *Assistant Professor of Biochemistry*
 Kalke, William, M.A., *Assistant Professor of Philosophy*
 Katzenmeyer, William G., Ed.D., *Associate Professor of Education*
 Klables, Gunter, M.A., *Instructor in German*
 Kort, Wesley, Ph.D., *Assistant Professor of Religion*
 Leach, Richard H., Ph.D., *Professor of Political Science*
 Lerner, Warren, Ph.D., *Associate Professor of History*
 Lievsay, John, Ph.D., *Professor of English*
 Lockhead, Gregory, Ph.D., *Associate Professor of Psychology*
 Lynts, George W., Ph.D., *Assistant Professor of Geology*
 Magubane, Bernard, Ph.D., *Visiting Professor of Sociology*
 Martin, David V., Ed.D., *Associate Professor of Education*
 Mellown, Elgin W., Ph.D., *Associate Professor of English*
 Naylor, Ernst, Ph.D., *Visiting Professor of Zoology*
 Novak, Richey A., Ph.D., *Assistant Professor of German*
 Oates, John F., Ph.D., *Associate Professor of Classical Studies*
 O'Barr, William M., Ph.D., *Assistant Professor of Anthropology*
 O'Neill, Bernard V., Jr., Ph.D., *Assistant Professor of Mathematics*
 Partin, Harry, Ph.D., *Assistant Professor of Religion*
 Peach, W. Bernard, Ph.D., *Professor of Philosophy*
 Pilkey, Orrin H., Ph.D., *Associate Professor of Geology*
 Pittillo, Robert, Ed.D., *Associate Professor of Education*
 Reynolds, Thomas D., Ph.D., *Associate Professor of Mathematics*
 Ricketts, Mac L., Ph.D., *Assistant Professor of Religion*
 Ripley, Dana P., Ph.D., *Assistant Professor of Romance Languages*
 Roberts, John, Ph.D., *Visiting Professor of Zoology*
 Salinger, Herman, Ph.D., *Professor of German*
 Searles, Richard B., Ph.D., *Professor of Botany*
 Shuman, R. Baird, Ph.D., *Professor of Education*

Smith, David A., Ph.D., *Associate Professor of Mathematics*
 Smith, Donald S., II, M.H.A., *Assistant Professor of Hospital Administration*
 Smith, Grover, Ph.D., *Professor of English*
 Stanley, D. Keith, Jr., Ph.D., *Assistant Professor of Classical Studies*
 Stefansson, Unnsteinn, Ph.D., *Adjunct Professor of Zoology*
 Stevenson, Lionel, Ph.D., *Professor of English*
 Sublett, Henry L., Jr., Ed.D., *Associate Professor of Education*
 Sutherland, John, Ph.D., *Assistant Professor of Zoology*
 TePaske, John, Ph.D., *Professor of History*
 Thomas, Norman, Ph.D., *Professor of Political Science*
 Thompson, Edgar T., Ph.D., *Professor of Sociology*
 Torre, Elias, Doctor en Filosofia y Letras (Madrid), *Associate Professor of Romance Languages*
 Turner, Arlin, Ph.D., *Professor of English*
 Viault, Birdsall, Ph.D., *Visiting Associate Professor of History*
 Vingiello, Frank A., Ph.D., *Visiting Professor of Chemistry*
 Warner, Seth L., Ph.D., *Professor of Mathematics*
 Wheeler, Samuel C., Ph.D., *Visiting Professor of Physics*
 Wilbur, Robert L., Ph.D., *Associate Professor of Botany*
 Wilder, Pelham, Jr., Ph.D., *Professor of Chemistry*
 Williams, George, Ph.D., *Professor of English*
 Wintermute, Orval S., Ph.D., *Associate Professor of Religion*



General Information

The Summer Session at Duke University makes available to Duke students, to students from other universities and colleges, to teachers in elementary and secondary schools, and to other special students a notable program of instruction in many fields of knowledge, both academic and professional.

Course programs offered during the summer are designed to meet special and particular needs as well as the more conventional requirements leading to specific degrees.

Postdoctoral research scholars may find the regular Summer Session courses useful for further study. The library facilities and the various laboratories may be of value for postdoctoral residents.

Graduate students who have been admitted to the Graduate School to study for the Master of Arts, Master of Education, and Master of Arts in Teaching degrees will find courses arranged in sequence from summer to summer to meet their requirements.

Teachers from elementary and secondary schools who desire to earn credits toward the renewal of their certificates and who are interested in further teacher training in subject content and method may enroll in senior-graduate courses as special or unclassified students.

Undergraduates of Duke University who desire to accelerate their programs may complete the work for a degree in three years by attending two or more Summer Sessions.

Undergraduates from other colleges and universities may enjoy the special advantages of summer instruction at Duke and transfer credits earned to their own institutions.

Although the summer course program meets in many departments the needs of degree candidates, it goes beyond these limits in also presenting courses of wide general interest and, in addition, special non-credit lectures, conferences, institutes, and workshops.

Duke University's ample and modern research facilities will be available during the summer to all properly qualified students. It is the hope of the University, of the summer faculty, and of the administrative officers that former students and new students will find increasing values in each summer spent at Duke.



Courses of Study and Requirements for Degrees

Undergraduate Study

Students in the undergraduate colleges of Duke University who desire to enrich or accelerate their academic programs will find the summer offerings of interest. Special courses are provided which are not otherwise available to undergraduates; election of the usual course offerings may relieve an overload during the fall or spring terms; and summer programs also enable some students to attain provisional graduate status in the senior year or to graduate early.

By attending both terms of the Summer Session it is possible for a student to earn credit for as many as four semester-courses (which, on a semester-hour basis no longer employed by Duke, is the equivalent of 12 s.h. credit). Instruction will be offered in the summer of 1970 in most departments and colleges. Specific requirements for degrees offered in the undergraduate colleges may be obtained from the regular *Bulletin of Undergraduate Instruction*.

Divinity School Studies

The degrees of Master of Divinity, Master of Theology, and Master of Religious Education are administered by the faculty of the Divinity

School. A limited number of courses carrying credits toward these degrees is listed herein under the heading of Divinity School. Persons desiring credit toward one of these degrees must be regularly admitted to the Divinity School, and all courses listed for Divinity School credit must be registered and approved in the office of the Divinity School.

Graduate Study

Degrees and Requirements. The Graduate School of Duke University now offers the following degrees: Master of Arts (A.M.), Master of Science (M.S.), Master of Science in Nursing (M.S.N.), Master of Education (M.Ed.), Master of Arts in Teaching (M.A.T.), Master of Hospital Administration (M.H.A.), Doctor of Philosophy (Ph.D.), and Doctor of Education (Ed.D.). A program leading to the Master of Business Administration (M.B.A.) is scheduled to begin in September, 1970. Specific requirements relative to admission, residence, major and minor studies, languages, and thesis may be obtained from the regular *Bulletin of the Graduate School*.

Summer Program for Graduates. Summer Sessions offer an excellent opportunity to advance or complete programs of graduate study already undertaken, to begin study toward a graduate degree at Duke University, to acquire graduate training useful in professional advancement, or to study for personal satisfaction. The several departments offer a variety of graduate courses, as listed in later pages, given by members of the Duke faculty and visiting professors. Especially full programs are provided in botany, education, English, history, psychology, sociology, and zoology.

Unclassified Graduate Students. Any student who holds an A.B. or B.S. degree and who does not intend to earn an advanced degree at Duke University but who desires graduate work for professional or other reasons should apply to the Director of the Summer Session for admission as an unclassified student. Credit earned by an unclassified student will serve all usual purposes except that it will not count toward an advanced degree at Duke University.

Cooperative Program in Teacher Education. Thirty-five to forty selected graduates of liberal arts colleges who desire to prepare for high-school teaching will be admitted to a special internship program at Duke University. This program is designed to prepare for a teaching career selected college graduates who did not prepare professionally for teacher certification as undergraduates. The Cooperative Program provides, for candidates who are chosen, graduate study in their special fields, professional courses, and carefully supervised observation and teaching experience. One who completes the program successfully can achieve within a

period of fifteen months a year of teaching experience, a Master of Arts in Teaching degree, and full certification as a teacher.

Candidates will begin the program at the opening of the Summer Session of 1970 and complete it in August of 1971. They will spend the summer preceding and the summer following the year of teaching in residence at the University. During the school year 1970-1971 interns will be employed as regular teachers in a cooperating public school system. During this year they will receive full salary and will work under the joint supervision of the cooperating public school and the University. The program will meet training qualifications for the advanced, or graduate, teacher's certificate in many states. Participants in the program are expected to teach for a second year as fully certified teachers in the school in which they complete the internship.

The salary for the year of teaching will, in effect, constitute a substantial award to candidates selected for the program. Interns will benefit from Duke University's special tuition rate for teachers. Applicants will be considered, as are candidates for other awards, on a competitive basis. The best qualified applicants will be chosen on the basis of undergraduate record, recommendations, and evidence of interest in becoming high-school teachers. Applicants are required to arrange interviews in connection with their applications. Application forms may be secured by addressing a request to the Dean of the Graduate School and should be submitted before February 15, 1970. Details concerning the program can be obtained by writing the Director, Cooperative Program in Teacher Education, Department of Education, Duke University.

Postdoctoral Research

Scholars engaged in postdoctoral research find it advantageous and sometimes essential to use in summer the resources of the Duke University libraries. The University welcomes these visitors and makes available to them the living accommodations of the dormitories and the dining halls during the Summer Session, June 9 to August 22.

Completion of Requirements for Degree on September 1

Candidates for degrees in the Graduate School desiring to have their degrees conferred on September 1 must have completed all requirements for the degree as of the final day of the Duke University Summer Session. A candidate completing degree requirements after that date will have his degree officially conferred at the following June Graduation Exercises. (Transfer of credit for work completed at other universities must be recorded by September 15.)

Special and Cooperative Programs

Cooperative Programs

The long standing reciprocal agreement between Duke and the University of North Carolina is now effective for the Summer Sessions at both universities. To take advantage of this arrangement for either term of the Summer Session the eligible student registers each term for three units of credit at the home institution and three units representing the course to be taken at the other institution, for a total of six units. A nominal registration fee of \$2 will be charged at the other institution. Credit so earned is not defined as transfer credit. This program applies to both graduate and undergraduate students.

Special Conferences and Courses

Special Programs for Teachers of Science and Mathematics

It is anticipated that the Summer Session will offer a number of special programs at the graduate level designed specifically for high-school teachers of science and mathematics. For detailed information on the

programs, teachers should write Dr. Thomas Reynolds, Mathematics Department, Duke University, Durham, North Carolina.

Highlands Biological Station

Duke University holds a subscribing instructional membership in the Highlands Biological Station at Highlands, North Carolina, on the southern edge of the Blue Ridge Mountains at an elevation of 4,118 feet. The situation and the region offer an excellent opportunity for field studies and some laboratory work. A limited number of qualified students in botany and zoology may make arrangements to carry out research at this station.

Medical Mycology

A month's course in Medical Mycology, under the direction of Dr. Norman F. Conant, is to be offered at Duke University School of Medicine and Duke Hospital, June 29-July 25, 1970. The course will be offered every day in the week, except Sunday, and has been designed to ensure a working knowledge of the human pathogenic fungi within the time allotted.

Emphasis will be placed on the practical aspects of the laboratory as an aid in helping establish a diagnosis of fungus infection. Insofar as possible and as patients become available, methods of collecting materials in the clinic for study and culture will be stressed. Work with patients, clinical material, cultures, and laboratory animals will serve as a basis for this course. Also, an opportunity to study pathologic material, gross and microscopic, will be given those whose previous training would allow them to obtain the greatest benefit from a study of such material.

The enrollment for the course will be limited and the applications will be considered in the order in which they are received. An attempt will be made, however, to select students on the basis of their previous training and their stated need for this type of work.

A fee of \$200.00 will be charged for this course, upon the completion of which a certificate will be awarded. However, an applicant upon acceptance into the course may register with the Summer School, pay its fees instead of the aforementioned fee, and receive four units of graduate credit for the course. Please direct all inquiries to Dr. Norman F. Conant, Professor of Microbiology, Duke University Medical School, Durham, North Carolina.

The Methodist Course of Study School

The twenty-first session of the short-term school for Methodist ministers taking the required course of study will be conducted during the period, July 6-31, 1970. Although this School is designed primarily for

Supply Pastors and other non-seminary candidates for the Methodist ministry, clergymen of any denomination may enroll. The curriculum as approved by the 1968 Methodist General Conference will be followed, and will include studies for license to preach, introductory studies, and the studies for the first, second, third, and fourth years, as well as advanced studies.

In addition to class work, there is provision for daily worship and a number of special lectures and workshops. A varied program of recreation and athletics will be supervised by the University Department of Physical Education.

Registration is scheduled for July 6. Classes begin on the morning of July 7 and continue through July 31. A descriptive folder giving details of the School will be ready for distribution about March 1, 1970, and copies may be procured by writing to Professor O. K. Ingram, Director, Box 4484, Duke Station, Durham, North Carolina 27706.

Divinity School Summer Clinics

Summer Clinics in Pastoral Care, Preaching, Theology, Parish Planning, and Campus Ministry are tentatively scheduled for August 3-14, 1970. These clinics are designed to supplement seminary education through two weeks of intensive training in one selected subject. Registration is open to ministers of all denominations. Participants are expected to attend the full two weeks from the opening dinner to the closing luncheon. Each clinic has its own leaders and schedule. No academic credit is given. Please address requests for information to: Summer Clinics, The Divinity School, Duke University, Durham, North Carolina 27706.

Resources for Study

Libraries

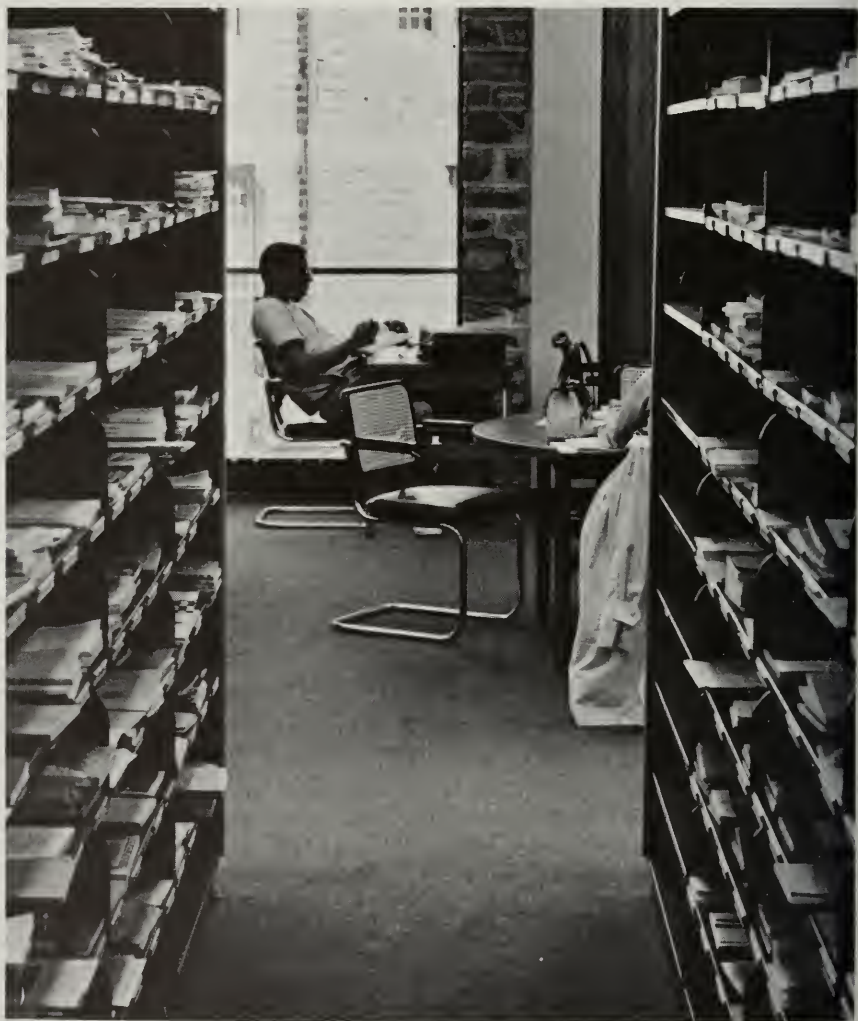
The new William R. Perkins Library building, the main research library of the University, was opened early in 1969. Providing more than twice the space available than existed in the old building, the Perkins Library has seating for 1,250 people and accommodates 1,500,000 books. When renovation of the old building is completed in 1970, the complex will have 2,100 seats, about 700 of which will be private study carrels in the stacks, and room for almost 2,500,000 volumes.

On June 30, 1969, the University Libraries contained 2,030,000 volumes and more than 4,000,000 manuscripts. About 90,000 volumes were added during the year; 170 newspapers and approximately 10,000 periodicals are received currently. Many rare, perishable, and out-of-print materials including books, newspapers, and periodicals are available in microtext form and may be read in a special microtext reading room in the new building.

All libraries of the University are open for use throughout the summer. A guide to the William R. Perkins Library which describes the building and its collections is available upon request addressed to the University Librarian, Perkins Library, Duke University, Durham, North Carolina 27706.

Laboratories

The laboratories in the various science departments (Botany, Chemistry, Physics, Psychology, and Zoology) are designed for both teaching and research. Ideal locations for special work in some of the sciences are available at Duke University Marine Laboratory at Beaufort, North Carolina; at Highlands Biological Laboratory at Highlands, North Carolina; in the Duke Forest at Durham, North Carolina; and in the Sarah P. Duke Gardens on the West Campus of Duke University.



Student Life

Living Accommodations

Students enrolled in the Summer Session of Duke University reside in the residence halls on West Campus. To provide maximum comfort and pleasant surroundings, use is made of the newer air-conditioned facilities in Few and Edens Quadrangles. Sections of Few Quadrangle are reserved for undergraduate men and separate sections of Edens Quadrangle are designated for graduate and undergraduate women. Additional space is provided for graduate women in the Graduate Center located near the Medical Center and in apartment-type accommodations in the University's Town House Apartments located on Swift Avenue, about one mile from the center of the campus.

Married students may rent family-type apartments which the University leases for student use.

Undergraduates, both men and women, are required to live in the residence halls unless they are married or living with parents or relatives. Any exception must be approved in advance by the Dean of Undergraduate Women or the Dean of Undergraduate Men.

The majority of residence hall rooms at Duke University are double rooms furnished for two persons. A limited number of single rooms are equipped for one person and are assigned in order of receipt of application with the required rental payment at the Department of Housing Management. No double room in the Edens or Few Quadrangles may

be reserved for single occupancy. Double rooms in the other residence halls may be rented for single occupancy at the rates shown on page 21.

Summer Session students who will be in residence at Duke University for both summer terms must so indicate on the Summer Session Housing Application and pay for both terms in advance. Those applicants who apply for housing for one term only but desire to remain for a longer period or those who fail to pay rent in advance for both terms at the time of application may be requested to move for the Second Term.

Assignment Procedures

Undergraduate Men. Sections of the Few Quadrangle halls will be reserved for undergraduate men. If additional spaces are required, one or more houses will be opened on the main quadrangle.

Undergraduate Women. Rooms in the Edens Quadrangle will be available for assignment to all undergraduate women.

Graduate Men. The men's section of the Graduate Center will be available for graduate men.

Graduate Women. A section of the Edens Quadrangle, spaces in Town House Apartments, and rooms in the women's section of the Graduate Center will be available for graduate women. Priority for Edens and Few Quadrangles and apartment-type accommodations will be given to those graduate women applicants who apply for eight weeks or more of the Summer Session and make payment for the entire period of application.

If accommodations of the student's first choice cannot be provided, other space will be assigned at the rental rate specified for the room to be occupied. The applicant will be notified of such change at the time the assignment is made.

Married Students. Students who will be accompanied by their families and desiring to occupy family units should write directly to the Director of Housing Management, Duke University, Duke Station, Durham, North Carolina 27706 for complete information on available accommodations and assistance which can be offered by the housing department.

Equipment

Edens and Few Quadrangles. Each student will be provided with a glide-out bed with spread, desk with chair, dresser with mirror, waste basket, and adequate closet space. Each room has draperies, carpeting, and wall book shelves. The student should provide a desk lamp, sheets, blanket, pillow, and other items desired. Beds measure 80 inches by 30 inches. These quadrangles are air-conditioned.

Graduate Center and Other Residences. Each student is provided with a 36 by 74 inch bed, dresser with mirror, desk with chair, and a bookcase.

The student should provide a desk lamp, sheets, blanket, and pillow. An electric fan is recommended since these residences are not air-conditioned.

Town House Apartments. Each attractive apartment is equipped for three women students, and includes living room, kitchen, master bedroom (two students) with half bath, a single bedroom (one student), and a master bath with tub and shower. Housekeeping supplies, kitchenware, and linens must be provided by the occupants. It is recommended that two or three students apply to reside together in one of these units. These units are available for limited numbers of families during summer months. The apartments are air-conditioned.

Dining Service

Food service is cafeteria style. The cost of meals runs from \$2.50 to \$3.00 per day, depending on the needs and tastes of the individual. Only the dining facilities on the West Campus will be used for the regular Summer Session students. The cafeteria in the Men's Graduate Center is usually not open in the summer.

Duke University Marine Laboratory

The Duke University Marine Laboratory, located on Pivers Island adjoining the United States Bureau of Fisheries across the Newport River from Beaufort, North Carolina, has cottage-type residence halls which will be available for Summer Session students. All rooms in the Marine Laboratory residence halls are equipped for two persons. There is a separate building for dining and social activity. Double rooms will not normally be occupied as single rooms for the Summer Session. Reservations for rooms at the Marine Laboratory at Beaufort should be made with the Business Manager, Duke University Marine Laboratory, Beaufort, North Carolina, by submitting a Summer Session Residence Hall Application with your personal check for the amount of your room rent.

Services Available

Medical Care

The Student Health Service, in the Duke Medical School Building, operates during the Summer Session and offers exactly the same medical and surgical services available to each full-time student during the academic year, as described completely in the *Bulletin of Information and Regulations*, but covers only six days of hospitalization in each term of Summer Session residence.

With the exceptions noted below, this service, under the direction

of the University physician, and with the cooperation of the staff of Duke Hospital, furnishes full medical and surgical care, drugs, dressings, X-ray work, and ward, but not special, nursing for any acute illness or injury, at no additional cost beyond the University fee for each term of residence or any shorter period. The cost of braces and necessary orthopaedic appliances and of blood, as well as special nursing, must be borne by the student. A charge for meals (\$1.80 per day) will be made while the student is in the Hospital. The student must pay all necessary telephone and telegraph charges. If students have insurance providing hospitalization, surgical, or medical benefits, these benefits shall be applied to the cost of their medical care. Refraction of eyes, treatment of teeth, and of all chronic and pre-existing conditions such as diseased tonsils, hernias, elective surgery, chronic skin conditions, endocrine disturbances, or accidents or illness occurring during vacation or while off campus are not included in this service.

No illness is treated in dormitory or other rooms occupied by students. Students needing treatment for minor medical or surgical conditions have the facilities of the Student Health Office in the Hospital between 9:00 a.m. and 4:00 p.m. on weekdays and from 9:00 a.m. until 12:00 noon on Saturdays. Emergency room care is available on Saturday afternoons, Sundays, and the 4th of July holiday. For admission to the Hospital, or for X-ray and consultation services, a student must present the 1970 Summer Session Student Identification Card as evidence that he is matriculated in the Summer Session and entitled to hospitalization. Students who register for three semester hours' credit, or for at least one hour of research, are entitled to medical care without charge.

Office of Placement Services

Duke University maintains an Office of Placement Services which acts as a liaison between the University and potential employers in business, education, and government. All services are offered without charge to students in the Summer Session who are registered for a degree at Duke University. The staff is available to talk with Summer Session students about their professional plans and with school officials who may be seeking the services of new teachers. Students who are eligible to register with the office are offered an opportunity to assemble a complete dossier of academic records and recommendations to supplement applications for positions and to have a permanent file for future reference. Pertinent recommendations are far easier to accumulate during the time a student is enrolled at Duke. Copies of academic records are released only with the permission of the individual.

The University Counseling Center

The University maintains a University Counseling Center which provides a centralized program of educational, vocational, and per-

sonal counseling for students. This confidential counseling service on problems of personal, social, educational, and vocational adjustment is provided without cost to students enrolled at the University. In addition, the Center administers special group testing programs for University schools and departments and serves as the local testing center for a wide variety of national testing programs. The Center also carries on programs of research in the field of measurement and counseling. Although the counseling, testing, and research services of the Center are designed primarily to meet the needs of the students, the faculty, and the staff of Duke University, these services are made available to individuals and organizations outside the University as its facilities permit. Requests for further information should be addressed to the Director, University Counseling Center, Duke Station, Durham, North Carolina, 27706.

Student Activities

Religious Life

Christian services of worship are conducted in the University Chapel every Sunday of the year, including those which fall during the summer. The hour of the service is eleven o'clock. Preachers representing all branches of Christendom appear in the pulpit, and they are drawn from every quarter of the globe. Choral music for these services is provided by a choir composed chiefly of student volunteers.

Recreation and Activities

The Summer Session will provide a varied program of entertainment and recreation. The program includes movies, dances, and open house socials. Tours to areas of interest can be arranged for weekends. Both the mountains and the seashore are easily accessible. Adequate facilities are available for those interested in swimming, tennis, and other sports. Clubs organized for the summer play an active part in all social activities and recreation.

Publications

During the Summer Session the University will publish each Saturday *The Duke University Calendar*, an official calendar announcing events—academic, social, and recreational—of the following week. This calendar also includes official notices concerning academic requirements. Students are expected therefore to read the *Calendar* regularly.

Conduct of Students

Duke University expects and will require of all its students continuing loyal cooperation in developing and maintaining high standards of scholarship and conduct.

The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University as currently in effect or, from time to time, are put into effect by the appropriate authorities of the University. The student is expected to be familiar with the current *Bulletin of Information and Regulations* as well as any published regulations for the Summer Session.

Any student, in accepting admission, indicates his willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate, for failure to abide by such rules and regulations or for conduct adjudged unsatisfactory or detrimental to the University. University authorities will take action in accordance with academic due process.



Admission

Students in the following categories may be admitted to the Duke University Summer Session:

1. Graduates and undergraduates who are presently enrolled and in good standing in Duke University.
2. Graduates and undergraduates who have been formally admitted, or readmitted, to Duke University.
3. Students who are currently in good standing at their respective institution and who have approval by the proper authority to take and transfer credits earned in the Duke Summer Session.
4. Teachers in service with or without the bachelor's degree who wish to earn credits for certification purposes.

Admission to specific courses offered in the Summer Session is governed by the student's academic status (freshman, sophomore, junior, senior, graduate, special, or unclassified) and by the prerequisites of the course in question.

Students in Residence at Duke University during the Spring Semester, 1970

A Duke University student, either graduate or undergraduate, who plans to attend the Summer Session should at the time of preregistration for the fall semester (see p. 28 for specific dates) enroll for the desired Summer Session courses. He need not file with the Summer Session Office the application blank at the end of this *Bulletin*.

Students Not in Residence at Duke University during the Spring Semester, 1970

Undergraduates. New students seeking to enter Duke University as freshmen or as undergraduates with advanced standing, and undergraduates who wish to re-enter the University should write the Office of Admissions requesting application forms.

Undergraduates, both men and women, enrolled in other colleges and universities who desire to earn in the Duke University Summer Session credits which are to be transferred to their own institutions should apply directly to the Director of the Summer Session, Duke University, on the application form at the end of this *Bulletin*. They should give accurately and clearly all information called for on the application form.

Graduates. Students who are seeking admission to the Graduate School and those who have been admitted to the Graduate School must apply to the Director of the Summer Session on the application form at the end of this *Bulletin*. Those who are seeking admission to the Graduate School *must also file* Graduate School application forms which may be secured by writing to the Dean of the Graduate School, Duke University, Durham, North Carolina.

Students with graduate standing and currently employed teachers, who wish only to earn credits toward and renewal or the advancement of their certificate, may enroll in the Summer Session as unclassified graduate students without becoming candidates for a degree at Duke University. Credit earned by unclassified graduate students will serve all usual purposes except that it will not count toward an advanced degree at Duke. All students in this category should apply to the Director of the Summer Session for admission. The application form at the end of this *Bulletin* may be used.

Postdoctoral Scholars

Application for these postdoctoral research privileges must be made in advance by letter to the Director of the Summer Session giving the applicant's present position, the specific field of his research interest, and the dates during which he desires to be in residence. Approved applicants will be accepted subject to the availability of library and of dormitory space.

Admission to Degree Candidacy

Undergraduates. A student seeking to enroll as a candidate for the bachelor's degree from one of the colleges of Duke University must meet the entrance requirements set forth in the *Bulletin of Undergraduate*

Instruction and be accepted by the Director of Admissions. This *Bulletin* may be secured by writing the Office of Admissions, Duke University.

Graduates. A student seeking to enroll as a candidate for one of the advanced degrees offered by the Graduate School of Duke University must meet the requirements set forth in the *Bulletin of the Graduate School*. This *Bulletin* may be secured by writing to the Office of the Graduate School.



Financial Information

Tuition and Fees

The University Tuition. This charge, which covers registration and medical care, is \$57.00 per semester hour or per unit. The tuition for a course will be determined by the number of semester hours or units indicated for the course in the 1969-70 Undergraduate and/or Graduate Bulletin. Special tuition rates have been established for:

1. Teachers in full-time service in elementary and secondary schools: \$28.50 per semester hour or unit.
2. Divinity School students approved by the Dean of that School: \$28.50 per semester hour or unit.

Laboratory Fees. For Marine Laboratory investigators' research table fees, see the *Marine Laboratory Bulletin*.

Medical Mycology Fee. This fee of \$200.00 replaces the University tuition.

Master's Degree Summer Session Tuition. A master's candidate who submits his thesis when not registered for at least the 1-unit research-residence tuition is required to pay a 1-unit tuition of \$57.00.

Auditing Fees. (See p. 30 for definition.) These fees are as follows:

1. Students registered for a full course program may audit non-laboratory courses (with the permission of the Director) at no extra charge.
2. Students carrying less than a full course program may be granted

permission to audit a course or courses on payment of half the University fee per semester hour or unit audited.

Late Registration Fee. Students who fail to register prior to the first class day of a given course will pay an extra fee of \$10.00.

Fee for Course Changes. Course changes other than those required by the University will be made only on payment of an extra fee of \$1.00 per change.

Fee for Make-up Final Examination. This fee is \$5.00.

Refund of Tuition and Fees. Tuition and fees will be refunded under the following circumstances:

1. When applications for withdrawal are received by the Director of the Summer Session before the close of registration on registration day, full tuition and fees will be refunded.
2. When applications for withdrawal are received by the Director of the Summer Session during the first four class days of a given term, 80 percent of the tuition and fees will be refunded.
3. When applications for withdrawal are received by the Director of the Summer Session after the fourth class day, there will be no refund of tuition and fees.

Debts

No records are released and no student is considered by the faculty as a candidate for graduation until he has settled with the Bursar for all indebtedness. Failure to pay bills on or before the due dates will debar the student from class attendance until the account is settled in full.

Living Accommodations

Edens and Few Quadrangles*

Single

10 weeks—	\$170.00
9 weeks—	153.00
8 weeks—	136.00
5 weeks—	85.00
4 weeks—	68.00
1 week —	17.00

Double

10 weeks—	\$125.00
9 weeks—	112.50
8 weeks—	100.00
5 weeks—	62.50
4 weeks—	50.00
1 week —	12.50

*Not available for graduate men. Space limited for graduate women. Air-conditioned.

Graduate Center and Other Residences†

<i>Single</i>	<i>Double</i>	<i>Double Rooms used as Singles</i>
10 weeks—\$110.00	10 weeks—\$87.50	10 weeks—\$140.00
9 weeks— 99.00	9 weeks— 78.75	9 weeks— 126.00
8 weeks— 88.00	8 weeks— 70.00	8 weeks— 112.00
5 weeks— 55.00	5 weeks— 43.75	5 weeks— 70.00
4 weeks— 44.00	4 weeks— 35.00	4 weeks— 56.00
1 week — 11.00	1 week — 8.75	1 week — 14.00

†Not air-conditioned.

Town House Apartments (Graduate Women)‡

\$18.00 each student per week (3 to an apartment)

\$27.00 each student per week (2 to an apartment)

‡Not assigned for less than four weeks. Air-conditioned.

Duke University Marine Laboratory

Five weeks—\$45.00 Per Person

Application for room or apartment reservations at Duke University, accompanied by the full amount of the room rent for the application period, should be made to Department of Housing Management, Duke University, Duke Station, Durham, North Carolina. Rooms and spaces in apartments will be reserved in the order in which applications are received, and on certification of admission by the Director of the Summer Session. Notification of assignment to rooms will be made about May 30 for the First Term, and about July 10 for the Second Term.

Rooms and apartments are available to applicants twenty-four hours prior to the registration for a specific term of the Summer Session. A room or apartment must be vacated by the occupant within twenty-four hours after his final examination or agreement period. Any period of occupancy, other than for a specific term of the Summer Session, must be arranged with the Department of Housing Management, House D, Room 101 R, Duke University.

Refund of Rent. Refunds are made under the following circumstances:

1. When notification for room cancellation is received by Department of Housing Management on or before fifteen (15) days prior to the registration date of the Summer Session term, full room rent will be refunded.
2. When notification for room cancellation is received between the fifteen (15) days prior to registration date and the first four class days, 80 percent of the room rent will be refunded.

- When notification for room cancellation is received after the first four days of a Summer Session term, 70 percent of the room rent for the unused period will be refunded.

Applicants should be sure to express their preference as to roommates, if they have a preference. If no preference of roommate is expressed, the Department of Housing Management will assign a roommate; however, this office does not assume responsibility in this matter.

Estimated Cost of One Term of Summer Session

University tuition, 6 s.h. or units	\$342.00
(Teachers, elementary and secondary, in full-time service pay \$171.00)	
Dormitory Rooms (Double room, 5 weeks)	43.75*
Meals (Cafeteria selective; average per day \$2.50)	90.00*
Books and Class Materials \$7.00 to \$10.00	8.50*
Miscellaneous (laundry, etc.)	12.00*
Total	\$496.25

*Approximate costs which will vary according to individual tastes and needs.

Student Aid

Special Tuition Rate to Teachers

Teachers in full-time service in elementary and in secondary schools, who are accepted by the Summer Session, pay only \$28.50 per semester hour or unit. Teachers on leave of absence from their schools and teachers not currently employed are not eligible for this special fee.

Scholarships for Public School Personnel

Duke University will offer twenty-seven special scholarships of \$200.00 each to high school and elementary teachers on a competitive basis (not by a written examination) for the Summer Session of 1970. This scholarship program is designed to encourage teachers to begin or to continue their graduate studies leading to the A.M., M.Ed., or M.A.T. degree.

Duke University will again offer five special scholarships of \$225.00 each to high school and elementary administrators and supervisors. This scholarship program is designed to encourage principals and supervisors to continue their graduate studies leading to advanced degrees.

Although successful applicants for the scholarships will not be required to become candidates for a degree, they must qualify for and receive admission to the Graduate School.

All applications with supporting documents must be submitted by

April 1, 1970. Selection and appointment of scholars will be completed by May 1, 1970.

Application blanks and complete information may be obtained from the Director of the Summer Session, Duke University, Durham, North Carolina 27706.

Loans

A number of loan funds have been established for the benefit of the students of Duke University. Several of these funds are available to students enrolled in the Summer Session. Students enrolled in the Summer Session *only* are not eligible. These funds are administered through a committee of officers of the University.

The committee, in approving loans, selects those students who, from the standpoint of character, scholastic attainment, and degree of financial need, are deserving of consideration.

Applicants for loans should make application to the Manager, Student Loan Office, Duke University. All applications must be initiated during the first week of each term. The granting or withholding of a loan is a matter entirely within the discretion of the Student Loan Committee. A student is expected to use all other possible means of securing financial assistance before applying for aid from a loan fund.

National Defense Education Act Loans. A limited number of loans may be made, under the provisions of the National Defense Education Act of 1958, to students in the Summer Session who have been regularly enrolled in the University prior to the Summer Session. A student who is enrolled for study in the Summer Session *only* is not eligible for consideration. Students pursuing the M.A.T. Cooperative Program are not eligible. Inquiries concerning opportunities available under this program for this benefit should be made to the Manager, Student Loan Office, Duke University, Durham, North Carolina 27706.

Remission of Tuition

Children of Methodist ministers who are members of the North Carolina and Western North Carolina Conferences of the United Methodist Church are entitled to a remission of the tuition charge as are the children of ministers of all faiths residing in Durham County, North Carolina. This consideration is given only to the children of resident members of the two North Carolina conferences who are giving their full time to religious work. Only those students enrolled in a regular undergraduate program leading to a baccalaureate degree from Duke University are entitled to this benefit. Students in this group are entitled to a maximum of eight semesters of free tuition at the undergraduate level. Application for this benefit should be made to the Director of Undergraduate Financial Aid, Duke University, Durham, North Carolina 27706.

Tuition Grants

Tuition grants are available to children of faculty and qualified staff members of Duke University. Information regarding the tuition grant program may be obtained by writing to the Director of Undergraduate Financial Aid, Duke University.

University Registration and Regulations

Definition of Terms

Registration. A student has completed registration for the Summer Session when:

1. His course program has been written and approved by the dean of the school or college in which he is enrolled or by the Director of the Summer Session in the case of the special or unclassified student.
2. Summer Session forms have been completed properly by the student in the Summer Session Office.
3. Summer Session University fees have been paid. A place in a course cannot be assured until fees have been paid. Tuition bills are not sent to the student's home.

Pre-enrollment. The term pre-enrollment refers only to the writing of the course program and its approval by the proper authority or by the Director of the Summer Session in the case of the special or unclassified student. Pre-enrollment alone does not constitute registration.

General Registration

Classes Beginning June 10. All Summer Session students whose classes begin on June 10, Term I, who *do not* complete registration in the Sum-

mer Session Office, 119 Allen Building, on or before June 5 *must* present themselves at general registration in the Summer Session Office, 119 Allen Building, on June 9 to register. Students will register during 30-minute periods alphabetically according to *surname* as indicated in the following table.

<i>Time</i>	<i>Registrants (Surname)</i>
8:30— 9:00	A—B
9:00— 9:30	C—E
9:30—10:00	F—H
10:00—10:30	I—L
10:30—11:00	Mc—N
11:00—11:30	O—P
11:30—12:00	Q—R
12:00—12:30	S—T
12:30— 1:00	U—Z

Classes Beginning June 17. All Summer Session students whose classes begin on June 17, Term I, must complete registration in the Summer Session Office, 119 Allen Building, on or before June 16.

Classes Beginning July 20. All Summer Session students who wish to register for courses offered during Term II or for research during Term II may register in the Summer Session Office on July 8 through July 15. All students who *do not* register for second term during this period *must* register in the Summer Session Office, 119 Allen Building, on July 17, between 8:30 a.m. and 1:00 p.m.

Classes Beginning on Other Dates. All Summer Session students registering for courses beginning on dates other than those specified above must complete registration in the Summer Session Office *before* the date on which their classes begin. Registration on the day on which classes are scheduled to begin will be considered late registration.

Late Registration

Any student who fails to register on or before the dates specified in the preceding paragraphs will be charged a fee of \$10.00 for late registration. No student will be permitted to register for a course of three semester hours or units after the third class day (June 12, Term I; July 23, Term II); a course of four semester hours or units after the second class day. Changes in courses other than those required by the University will require a payment of \$1.00 for each change made. All changes must be approved by the dean of the school or college in which the student is enrolled or, in the case of the special or unclassified student, by the Director of the Summer Session. Changes in courses may be made within the first three class days. These registration rules are enforced rigidly.

Since Summer Session courses present a program of study in more concentrated and rapid form than in the regular semesters, students are advised to register on time and to be present at all class sessions.

Advanced Registration

Students in Residence at Duke University during the Spring Semester, 1970

Writing Course Programs in the Schools and Colleges. Students in residence at Duke University during the spring semester, 1970, both graduate and undergraduate, who plan to enroll for courses offered in the 1970 Summer Session or to carry on research during the period of the Summer Session will write course programs and have them approved in their respective schools or colleges during the week of preregistration, April 13-16, 1970. Graduate students will preregister on April 13-14.

Advanced Registration in the Summer Session Office. Students in residence whose course programs have been written and approved by their respective colleges on the dates indicated above may complete their registration in the Summer Session Office, 119 Allen Building, on the following dates:

Graduate and undergraduate students—May 8 through June 5.

Registration in the Summer Session Office includes:

1. Completion of various Summer Session forms.
2. Payment of University fees.

A student who registers with the Summer Session Office during this period will not be required to be present at general registration on June 9. He will begin his class work on the date his classes are scheduled to begin: June 10 or June 17.

Students Not in Residence at Duke University during the Spring Semester, 1970

Advanced Registration by Mail. Students not in residence at Duke University during the Spring Semester, 1970—new undergraduate students seeking to enter as degree candidates, graduate students who are not candidates for an advanced degree at Duke University, graduate and undergraduate students of other colleges and universities desiring to earn credits for transfer, public school teachers, and college teachers (not advanced degree candidates)—may register by mail. Advance registration by mail includes:

1. Completion in full of the application form at the end of this *Bulletin*.
2. Admission to the Summer Session by the Director of the Summer Session and, in the case of students seeking to enter Duke University

as degree candidates, admission by the Admission Directors to the school or college of Duke University concerned.

3. Completion in full and return of forms required by the Summer Session Office by June 5.
4. Payment of University fees by June 5. A student may *pre-enroll* by mail without paying the University fees but he *cannot register in advance* without doing so.

Students who complete registration by mail on or before June 5 need not be present at the general registration on June 9.

Degree Candidate Graduate Students Not in Residence during the Spring Semester, 1970

A graduate student not in residence during the spring semester 1970, who is a candidate for an advanced degree in the Graduate School of Duke University, may complete his registration by mail if his Director of Graduate Studies and the Graduate School Office approve the registration. Any graduate student unable to complete registration by mail must present himself for registration in the Summer Session Office, on June 9, Term I, and July 17, Term II. The student will follow the same four steps given above.

Registration of Graduate Students

Graduate students in residence during the spring semester will pre-register for either or both terms of the Summer Session on April 13-14. Other students who have been admitted to the Graduate School should present themselves for registration at the official registration period, June 9 for the first term, and July 17 for the second term. They are required to register both with the Summer Session and the Graduate School.

Graduate students resident in the spring semester who intend to remain in residence during either or both of the two Summer Session terms without registering for course work or research must register for one unit (one semester hour) to cover the cost of medical care and the use of University facilities. This one unit (one semester hour) of registration will entitle students to use the Student Health Service and University facilities during both terms of the Summer Session. The master's candidate who has completed all requirements except submission of the thesis and who so registers is not charged any separate fee for submitting the thesis.

Academic Regulations

Kinds of Course Enrollment

Summer Session courses may be taken for credit, non-credit, or may be audited. A student's program may be exclusively in one of these categories, or may combine any two of them or all three. Students taking a full or partial program for credit may enroll as auditors or as non-credit students in any number of additional courses.

Credit. The Summer Session term *credit* does not mean degree credit at Duke University unless the student has been admitted as a degree candidate by one of the colleges or schools of the University. A student taking a course for credit is expected to do all the work required and to take the final examination, and he will receive a grade. G.I. Bill benefits are available only to those veterans who enroll for credit.

Non-credit. Non-credit enrollment is available to the student who wishes the privilege of participating in class discussions, exercises, and the laboratory assignments but does not wish to take the examinations, either mid-term or final. A non-credit student may do as much of the work of the course as he desires, but he may not take the final examination and he will not receive a grade. Full fees of \$57.00 per semester hour or unit are required in non-credit enrollment.

Audit. An auditor is entitled to listen to lectures and class discussions, but he may not participate in discussions or take examinations. Students may not enroll as auditors in laboratory courses. A student carrying a full program for credit may be given permission to audit as many courses as he desires without additional fees. Students carrying less than a full program for credit may secure permission to audit but are required to pay the auditing fee, which is half the regular unit fee.

Credits

The Summer Session courses are of the same quality and credit values as courses in the regular semester. Credit earned in the Summer Session is in terms of semester hours or units. The majority of Summer Session courses carry 3 semester hours or units credit and require one term in residence. A limited number of basic courses in the sciences carry 4 s.h. or units credit (chemistry, geology, physics).

Credits for Transfer. A student desiring either graduate or undergraduate credits transferred from Duke University to his university or college as degree credit must request from the Director of the Summer Session, Duke University, a Course Approval Form to be completed by the student's dean or registrar and returned to the Director of the Summer Session, Duke University.

Transfer of Graduate Credits. Under certain circumstances a maxi-

mum credit of six units in a master's degree program may be allowed for graduate courses completed elsewhere. Approval for the transfer of credits will not be given until the student has spent one semester or two terms in residence. The acceptance of credit up to this amount will not reduce the minimum period of full-time registered residence at Duke University. In no case will credit be allowed for extension or correspondence courses.

With the approval of both the student's major department and the Dean of the Graduate School, a student who is granted such transfer for credit may be permitted to register for as much as twelve units for thesis research instead of the usual six units. Or he may be permitted to fill out his schedule with as much as six semester hours or units of further undergraduate training or six semester hours or units of required language courses on the undergraduate level.

For regulations concerning applying graduate credit earned elsewhere to a graduate program here, consult the *Bulletin of the Graduate School*.

See page 6 for information concerning reciprocal agreement with the University of North Carolina.

Professional Credits Toward Teacher's Certificates. Professional credits toward teacher's certificates are granted by the various state boards of education, each in accordance with its own carefully planned rules. Teachers in service, before enrolling for certification credit, should consult the rules laid down by their State Board of Education. If necessary, they should send to their State Board of Education a list of the courses in which they plan to enroll and inquire whether these will be acceptable for certification credit.

Maximum Course Program

The maximum program for one term of the Summer Session is seven semester hours or units, or two courses. The four semester hour (unit) courses in the sciences run for four weeks and one such course usually constitutes a full course program.

Grading

Only a student taking a course for credit will receive a grade. The grade given represents the quality of the work done in the course.

Passed.

Undergraduate Grades

- A—excellent
- B—good
- C—average
- D—poor but passing

Graduate Grades

- E—exceptional
- G—good
- S—satisfactory

Failed. A grade of *F* indicates that the student has failed the course, and in order to receive credit for the course he must repeat the work in class.

Incomplete. A grade of *I* may be reported by the instructor if for any reason he is unable to report the final grade at the regular time. Incomplete courses must be completed before the close of the succeeding semester; otherwise the *I* is recorded as *F*, and the course must be repeated in class if the student is to receive credit for it.

Absent from Final Examination. The grade of *X* indicates that the student was absent from the regularly scheduled examination. A student absent from examination, if the absence has been excused by the dean of the college or school in which he is enrolled or, in the case of the special or unclassified student, by the Director of the Summer Session, may receive an examination upon the payment of \$5 to the Bursar of the University. The instructor concerned arranges for the examination in cases where absences are excused. A student with an *X* grade who has not obtained a passing grade before the end of the semester following that in which the *X* was incurred is regarded as having failed in the course concerned and must repeat the work in class in order to receive credit. If a student's absence from an examination is not excused by the dean of the college or school in which he is enrolled or, in the case of the special or unclassified student, by the Director of the Summer Session, his grade for the course concerned is recorded as *F*.

Pass-Fail Option for Elective Courses. With the consent of the instructor, a junior or senior may choose to be graded on a pass-fail basis in one elective non-major course each term of a summer session. A student accepted on this basis completes all the work of the course but receives either a pass (*P*) or fail (*U*) grade in lieu of a standard grade. A pass grade may not subsequently be converted to a regular letter grade nor may the course be retaken for a letter grade.

Examinations

Final examinations in courses are held on the last two days of each term. Final examinations for short courses which occupy the student's complete program will be held on the last day of the course. The examination dates for 1970 are:

First term: July 14-15.

Second term: August 21-22.

Courses in science for the first term have been scheduled so that their final examination will come on July 15. The science courses which begin July 20 and run for four weeks will have their final examination on August 14. The University has no provision for giving examinations *in absentia*. Students absent from examinations for valid reasons are permitted a

liberal extension of time to return to the University for completion of credit.

Continuation Requirements

A student must achieve a satisfactory record of performance during the Summer Session in order to maintain his enrollment at Duke. He may be dismissed temporarily or permanently by the dean of his college or the Director of the Summer Session for failure to make satisfactory progress.

Dropping of Courses

If a student drops a course without permission from the dean of the school or college in which he is enrolled or, in the case of the special or unclassified student, the Director of the Summer Session, the grade for that course is recorded as *F*. If he drops a course with permission, the grade for that course is *F* unless, in the judgment of the dean or director, circumstances do not justify this penalty.

Withdrawal from the Summer Session

If a student wishes to withdraw from the Summer Session, he must notify both the dean of the school or college in which he is registered and the Director of the Summer Session.

Other Regulations

Motor Vehicle Registration

Students enrolled in the Summer Session must register their motor vehicles with the Traffic Office, 08 Social Science, West Campus.

Courses of Instruction

Eligibility for Course Enrollment

Courses numbered 1-49 are primarily for freshmen, or freshmen and sophomores. Courses numbered 50-99 are ordinarily for sophomores, or sophomores and juniors. Courses numbered 100-199 are designed for juniors and seniors. Courses numbered 200-299 are planned for seniors and graduates. Courses numbered 300 up admit graduate students only. Courses numbered from 200 up are limited in enrollment to 25 students.

Minimum Enrollment Required for Courses

All courses are offered subject to minimum enrollments. The University reserves the right to withdraw undergraduate courses in which fewer than twelve students enroll, senior-graduate courses numbered 200-299 in which fewer than ten students enroll, and graduate courses and seminars numbered 300 or above in which fewer than six students enroll. In withdrawing a course, the University attempts to avoid undue hardships on students. Sometimes, therefore, courses are offered in spite of small enrollments. Courses not listed will be given when a demand develops and an instructor is available.

Department Officers and Regulations

Departments offering Summer Session programs are listed alphabetically. Under each department is given the name of the chairman, of the director of graduate studies, and of the director of undergraduate

studies. Where departments have set up special regulations for admission to candidacy for the master's degree, these are included.

Summer Session Schedule of Classes

Summer Session classes will meet Monday through Friday of each week unless otherwise indicated. Saturdays are available for special conferences or class work.

Class periods are as follows:

First period — 8:00 a.m.- 9:20 a.m.

Second period — 9:40 a.m.-11:00 a.m.

Third period —11:20 a.m.-12:40 p.m.

Fourth period — 1:40 p.m.- 3:00 p.m.

Anatomy

Professor J. David Robertson, *Chairman* (401 Davison, West Campus); Professor John Buettner-Janusch, *Director of Graduate Studies* (Old Laundry Building, West Campus)

First Term

M 151. *Anatomy of the Lower Extremities as it Relates to Locomotion.* Dissection of the human adult lower extremity. Demonstration and discussion of gait, biomechanics, and kinesiology. 9:40-11:00. One course. Bassett

Second Term

M 151. *Anatomy of the Lower Extremities as it Relates to Locomotion.* Dissection of the human adult lower extremity. Demonstration and discussion of gait, biomechanics, and kinesiology. 9:40-11:00. One course. Bassett

Biochemistry

Professor Robert Hill, *Chairman* (Medical Sciences Building); Professor Kenneth S. McCarty (Medical Sciences Building), *Director of Graduate Studies*

First Term

S 208. *Laboratory Methods in Biochemistry.* An advanced laboratory course that emphasizes current procedures, instrumentation, and experi-

ments. Each student selects from a number of experiments of a wide range of classical investigations that illustrate significant biochemical progress. Prerequisite: Biochemistry 303 and 308, or equivalent. Hours to be arranged. One course (3 graduate units). *Joshi*

Botany

Professor Terry W. Johnson, Jr., *Chairman* (354 Biological Sciences Building, West Campus); Associate Professor Robert L. Wilbur, *Director of Graduate Studies* (265 Biological Sciences Building, West Campus); Associate Professor Richard A. White, *Director of Undergraduate Studies* (371 Biological Sciences Building, West Campus)

Students admitted to candidacy for an advanced degree in botany should have completed a minimum of 12 semester hours of courses in botany (or biology) beyond an elementary course, and related work in biological sciences. Students who have not yet had the minimum hours, however, may enter higher courses by permission of the instructor, if he is convinced that they can carry the work for undergraduate credit, and may count such work toward hours necessary for candidacy.

First Term (Duke Campus)

225. *Special Problems*. Hours to be arranged. *Staff*

359. *Research*. Hours to be arranged. *Staff*

First Term (Duke Marine Laboratory, Beaufort, North Carolina)

211. *Marine Phycology*. An introduction to marine algae: their identification, taxonomy, morphology, physiology, and ecology. Field trips complemented by laboratory study, culturing, and preparation of herbarium material. Two courses (6 graduate units). *Searles*

225. *Special Problems*. Hours to be arranged. *Searles*

359. *Research*. Hours to be arranged. *Searles*

Second Term (Duke Campus)

226. *Special Problems*. Hours to be arranged. *Staff*

360. *Research*. Hours to be arranged. *Staff*

Second Term (Duke Marine Laboratory, Beaufort, North Carolina)

220. *Coastal Field Botany*. Survey of the regional flora with attention to ecological associations of the Beaufort area. Daily field trips for collection and intensive study of the rich vascular flora. Prerequisite: one

year of college biological science. Two courses (6 graduate units).
Wilbur

226. *Special Problems*. Hours to be arranged. *Wilbur*

360. *Research*. Hours to be arranged. *Wilbur*

Chemistry

Professor Charles K. Bradsher, *Chairman* (101 New Chemistry Building, West Campus); Professor Louis D. Quin, *Director of Graduate Studies* (376 New Chemistry Building, West Campus); Associate Professor James F. Bonk, *Director of Undergraduate Studies* (213 New Chemistry Building, West Campus)

All classes in Chemistry, Term I, will begin on June 17 and continue through July 15. All classes in Chemistry, Term II, will begin on July 20 and continue through August 14. Students who wish to avoid paying a late registration fee must have their registration completed in advance of these dates. For registration dates see General Registration on page 26 of this *Bulletin*.

First Term

1. *General Inorganic Chemistry*. Lectures, recitations, and laboratory work on the elementary principles of chemistry and on the occurrence, preparation, properties, and uses of the elements and their compounds. Laboratory daily, 9:30-12:00; recitation and lecture daily, 12:45-2:45. One course. *Baxter*

61. *Fundamentals of Analytical Chemistry*. A study of the relations of electrolytes in solution and of chemical equilibrium illustrated by laboratory experiments involving the techniques of gravimetric, volumetric, and colorimetric analysis. Prerequisites: Chemistry 1-2 and Mathematics 21 or equivalent. Lecture or recitation daily, 8:30-10:00; laboratory daily, 10:30-12:30 and 1:30-4:00. One course. *Wilder*

151. *Organic Chemistry*. An introduction to the study of carbon compounds. Compounds of the aliphatic series form the basis of lectures, discussions and laboratory experiments. Prerequisite: Chemistry 61. Recitation daily, 8:00-9:00; laboratory daily, 9:00-12:00; lecture daily, 12:00-1:00. One course. *Fredericksen*

275. *Thesis Research*. Research in the fields of physical, analytical, inorganic, or organic chemistry. Open to those students whose research programs for the A.M. and Ph.D. degrees have been approved by the department and by one of the instructors in charge of the course. Schedule to be arranged. (Not more than one semester hour of credit per week for full-time schedule or one semester hour each two weeks for half-time schedule.) 2 to 8 units. Available Terms I and II.

Second Term

2. *General Inorganic Chemistry*. A continuation of 1. Prerequisite: Chemistry 1. Laboratory daily, 9:30-12:00; recitation and lecture daily, 12:45-2:45. One course. *Bonk*

152. *Organic Chemistry*. A study of compounds of the aromatic series and of carbohydrates and proteins. Prerequisite: Chemistry 151. Recitation daily, 8:00-9:00; laboratory daily, 9:00-12:00; lecture daily, 12:00-1:00. One course. *Vingiello*

Classical Studies

Professor Francis Newton, *Chairman* (326 Carr Building, East Campus); Associate Professor Hilburn Womble, *Director of Undergraduate Studies* (320 Carr Building, East Campus)

Classical Studies

First Term

51. *Greek Literature in English Translation*. Reading in translation of the major Greek authors: Homer, *Odyssey*; lyric poets; Aeschylus, *Oresteia*, Herodotus; Sophocles, *Oedipus Tyrannus*, *Antigone*; Euripides, *Medea*, *Hippolytus*, *Bacchae*; Plato, *Symposium*. 11:20-12:40. One course. *Stanley*

53. *Greek History*. (Also History 53.) The political and intellectual history of the Hellenes from earliest times to the death of Alexander the Great. 8:00-9:20. One course. *Oates*

54. *Roman History*. (Also History 54.) The Roman republic and empire to the Council of Nicaea. 9:40-11:00. One course. *Oates*

Comparative Literature

First Term

191. *Independent Study*. Directed reading and research. Open only to qualified students in the junior year, by permission of the Department. One course. *Salinger*

193. *Independent Study*. Directed reading and research. Open only to qualified students in the senior year, by permission of the Department. One course. *Salinger*

205. *Foundations of Twentieth-Century European Literature*. The roots of the contemporary scene (Proust, Mann, Rilke, Kafka, Lagerkvist,

Camus, Hesse) evolving toward a mythology of man. 11:20-12:40. One course (3 graduate units). *Salinger*

Divinity School

Professor Robert E. Cushman, *Dean of the Divinity School* (124 Divinity School, West Campus)

First Term

277A. *Clinical Pastoral Education II*. CPE in the General Hospital Setting. A: Summer Quarter of CPE. Permission of Director of Studies in Pastoral Care required. Hours to be arranged. 4 units. *Staff*

Economics

Professor John O. Blackburn, *Chairman* (302 Social Science Building, West Campus); Professor William P. Yohe, *Director of Graduate Studies* (313 Social Science Building, West Campus); Professor Peter B. Clark, *Acting Director of Undergraduate Studies* (236 Social Science Building, West Campus)

First Term

51. *Principles of Economics*. Examination of the main features of the American economy, measurement of national income, and analysis of forces determining national output and income; fluctuation and growth of output; monetary and fiscal policies for stability and growth. 9:40-11:00. One course. *Havrilesky*

154. *Aggregative Economics*. Concepts and measurement of national income and expenditures, employment, and price levels; the theoretical determination of these aggregates; and applications of macroeconomic theory to business cycles and economic growth. 11:20-12:40. One course. *Havrilesky*

287. *Public Finance*. An analysis of the impact of governmental expenditures, revenues, and debt on the allocation of resources, the redistribution of income, and the stabilization of income. 11:20-12:40. One course (3 graduate units). *Davies*

Second Term

52. *Principles of Economics*. Examination of forces determining prices and production of goods, distribution of income; problems of agriculture, labor, international trade, economic development, and government in relation to business. 9:40-11:00. One course. *Staff*

149. *The Theory of the Firm*. Cost and supply considerations in price theory, the demand for factors of production. The allocation of resources is examined in the context of competitive and monopolistic market structures. 11:20-12:40. One course. Staff

Education

Professor William H. Cartwright, *Chairman* (08C West Duke Building, East Campus); Professor Allan S. Hurlburt, *Director of Graduate Studies* (07 West Duke Building, East Campus); Professor Charles B. Johnson, *Director of Undergraduate Studies* (08D West Duke Building, East Campus)

Duke University is accredited by the National Council of Accreditation of Teacher Education for the preparation of elementary and secondary school teachers and school service personnel with the doctor's degree as the highest degree approved.

It is the intention of the Department to make available to degree candidates all courses ordinarily required for certification as graduate teachers, counselors, principals, and superintendents. These courses will normally be offered at least once every three years.

First Term

207. *Social History of Twentieth-Century American Education*. The development of twentieth-century American education in the context of social and intellectual history. 8:00-9:20. One course (3 graduate units). C. Johnson

211. *The Problem Child* (Also Psychology 211.) Study of problem behavior and adjustment in children with emphasis on the causes and treatment of conduct and neurotic disorders of the maladjusted child. Particular attention will be paid to mental hygiene principles in the handling of problem children in school and home. 9:40-11:00. One course (3 graduate units). I. Gehman

225. *The Teaching of History and the Social Studies*. Evaluation of the objectives, content, materials, and methods in the teaching of history and the social studies. 8:00-9:20. One course (3 graduate units). Cartwright

226. *Teaching Reading in the Elementary School*. A study of the nature of the reading process and of principles, methods, and materials for the developmental and remedial programs. 11:20-12:40. One course (3 graduate units). J. Johnson

233. *Improvement of Instruction in English*. This course will acquaint the student with recent developments in the teaching of English and

will introduce him to research techniques in the field. Each student will pursue an extensive independent study based on his particular interests. 11:20-12:40. One course (3 graduate units). *Shuman*

234. *Secondary-School Organization and Administration*. This course is designed especially for principals, teachers, and other prospective members of the secondary-school staff. The scope of secondary education is considered to encompass junior high school, regular high school, senior high, and junior college. Special treatment is given to the problems of internal organization and management. 11:20-12:40. One course (3 graduate units). *Pittillo*

237. *The Teaching of Literature in Secondary Schools*. This course surveys the literature generally taught in secondary schools. Both adult and transition-type literature are considered. Methods of organizing the program and of teaching literature are explored. 1:20-2:40. One course (3 graduate units). *Shuman*

238. *Content, Supervision, and Administration of Reading Programs*. The nature and functions of the objectives of various reading programs, organization of such programs, their major attributes, and their evaluation. For supervisors, teachers, and administrators. 9:40-11:00. One course (3 graduate units). *J. Johnson*

243. *Personality Dynamics*. A study of personality structure and dynamics with emphasis upon the implications for counseling and instruction. Prerequisite: six hours of psychology or educational psychology. 8:00-9:20. One course (3 graduate units). *S. Gehman*

246. *The Teaching of Mathematics*. This course deals with such topics as aims, curriculum, course and lesson planning, and classroom procedure for teaching secondary-school mathematics. (June 10-June 26.) 11:20-12:40 and 2:00-3:20 Monday through Friday. One course (3 graduate units). *Reynolds*

250, 251. *Teaching Emotionally Disturbed Children: Internship*. Basic principles and practices in teaching and the organization of instructional materials. Work with children under the supervision of a certified teacher of emotionally disturbed children. Experience in general classroom teaching and small group and individualized instruction. Participation in staff conferences involving psychiatrists, psychologists, social case workers, and professional educators. Hours to be arranged. One course (3 graduate units) each. *S. Gehman*

276. *The Teaching of High-School Science*. Discussion, lectures and collateral reading, related to such topics as aims, tests, curriculum, classroom and laboratory procedure, field trips, course and lesson planning for secondary-school science. 2:00-4:00 daily, Monday through Friday. One course (3 graduate units). *Githens*

315. *Seminar in Secondary-School Teaching*. Advanced-level consideration of principles, practices, and problems in secondary-school instruction. Designed particularly to accompany an internship. For students without

previous internship credit, this course must be accompanied by Education 216.

315.1 8:00-9:20. 3 units. *Hurlburt*

315.2 12:15-1:35. 3 units. *C. Johnson*

322. *Planning and Management of Educational Facilities*. A study of planning and management of educational facilities and equipment. This course is intended for teachers, administrators, and supervisors. 9:40-11:00. 3 units. *Pittillo*

332. *Supervision of Instruction*. A study of the nature of supervision, underlying principles, and techniques of working with individual teachers and with groups. 9:40-11:00. 3 units. *Hurlburt*

342. *Seminar in Secondary School Curriculum*. Research, writing, and reporting on selected problems. 9:40-11:00. 3 units. *Cartwright*

Second Term

213. *Elementary-School Organization and Administration*. This course is designed especially for principals, teachers, and other prospective members of the elementary-school staff. The scope of elementary education is considered to encompass nursery school, kindergarten, and the elementary school. Special treatment is given to the problems of internal organization and management of the elementary school, and its integration with the secondary-school level. 9:40-11:00. One course (3 graduate units). *Sublett*

217. *The Psychological Principles of Education*. An advanced study of teaching, learning, and the learner. Selected problems guiding the reading of students will be discussed in class. 9:40-11:00. One course (3 graduate units). *Katzenmeyer*

221. *Programs in Early Childhood Education*. This course is designed to examine the objectives and philosophy underlying the establishment of programs in early childhood education. It will include an overview of existing practices, research findings and experimental projects dealing with the social, emotional, physical and cognitive development of the young child. 9:40-11:00. One course (3 graduate units). *Flowers*

223. *Teaching the Language Arts*. Comparison of current methods and materials in the teaching of handwriting, spelling, and oral and written composition. Analysis and correction of basic difficulties. Increasing opportunities for creative expression. Correlation of language arts with other activities and school subjects. 8:00-9:20. One course (3 graduate units). *Flowers*

253. *Law and Education*. This course examines elements and problems of educational organization which have come within the purview of constitutional and legislative provisions and court decisions. Emphasis is placed on conflict among members of educational organizations and between educational organizations and other parties which has resulted in appellate court decisions. Students are expected to select appropriate

problems for intensive study. 11:20-12:40. One course (3 graduate units). *Martin*

260. *Introduction to Educational Research*. Research methodologies: experimental, historical, survey, philosophic, case study. Fundamentals of statistical inference, research design, and computer applications to research problems. 8:00-9:20. One course (3 graduate units). *Katzmeyer*

339. *Seminar in Curriculum*. Research, writing, and reporting on selected problems. 11:20-12:40. 3 units. *Sublett*

Engineering

Professor George W. Pearsall, *Acting Dean of the School of Engineering* (136 Engineering Building, West Campus); Associate Professor E. K. Kraybill, *Associate Dean of Undergraduate Studies* (136 Engineering Building, West Campus)

First Term

C.E. 365. *Advanced Topics in Civil Engineering*. Opportunity for study of advanced subjects relating to programs within the Civil Engineering Department tailored to fit the requirements of a small group. 1 to 3 units. *Graduate Staff*

C.E. 399. *Special Readings in Civil Engineering*. Special individual readings in a specific area of study in Civil Engineering. Prerequisite: approval of the Director of Graduate Studies. 1 to 3 units. *Graduate Staff*

E.E. 265. *Advanced Topics in Electrical Engineering*. Opportunity for study of advanced subjects related to programs within the Electrical Engineering Department tailored to fit the requirements of a small group. Prerequisite: approval of the Director of Graduate Studies and of instructor under whom work will be done. 1 to 3 units. *Graduate Staff*

E.E. 399. *Special Readings in Electrical Engineering*.^{*} Special individual readings in a specified area of study in electrical engineering. Prerequisite: approval of the Director of Graduate Studies. 1 to 3 units. *Graduate Staff*

M.E. 197-198. *Projects in Mechanical Engineering*. This course may be assigned by the Chairman of the Department to outstanding seniors who express a desire for such work and who have shown aptitude for research in one distinct field of mechanical engineering. Prerequisite: 3.0 average and senior standing. One-quarter to two courses. *Staff*

M.E. 265. *Advanced Topics in Mechanical Engineering*. Opportunity for study of advanced subjects related to programs within the Mechanical Engineering Department tailored to fit the requirements of a small group.

Prerequisite: approval of the Director of Graduate Studies and of instructor under whom work will be done. 1 to 3 units. *Graduate Staff*

M.E. 399. *Special Readings in Mechanical Engineering*. Special individual readings in a specified area of study in mechanical engineering. Prerequisite: approval of the Director of Graduate Studies. 1 to 3 units. *Graduate Staff*

English

Professor Oliver Ferguson, *Chairman* (325 Allen Building, West Campus); Professor John L. Lievsay, *Director of Graduate Studies* (321 Allen Building, West Campus); Professor George Williams, *Director of Undergraduate Studies* (402 Allen Building, West Campus)

Candidates for the master's degree in English are expected to have had at least eighteen semester hours in undergraduate courses above the sophomore level. The Department may also require additional courses if the work of the student in his first term indicates inadequate preparation.

First Term

55. *Representative British Writers*. Chaucer's Prologue to The Canterbury Tales, and at least two tales, Shakespeare's I Henry IV, Hamlet, or King Lear, and one other play, John Donne's poetry (selections), and Milton's Paradise Lost (selections) and some of the shorter poems. 8:00-9:20. One course. *DeNeef*

129. *The English Novel in the Twentieth Century*. Some of the writers studied are Conrad, Lawrence, Forster, Joyce, Woolf, Huxley, Cary, Amis, and Golding. 11:20-12:40. One course. *Smith*

175. *American Literature from 1860 to 1915*. Dickinson, Twain, James, the social and philosophical essayists, Crane, Dreiser, Robinson, and Frost. (Not open to students who have taken 138.) 9:40-11:00. One course. *Jones*

219. *The Eighteenth Century*. Swift, Pope, Defoe, Addison, Steele, and others are studied. 9:40-11:00. One course (3 graduate units). *Ferguson*

229. *American Literature, 1800-1865*. Writers emphasized are Emerson, Thoreau, and Hawthorne. 11:20-12:40. One course (3 graduate units). *Jones*

251. *English Literature in the Seventeenth Century*. Major works in prose, poetry, and drama from 1600 to the death of Dryden. 11:20-12:40. One course (3 graduate units). *Lievsay*

261. *English Literature of the Twentieth Century*. Representative work of drama and poetry. Shaw, Conrad, Yeats, Wells, Bennett, Galsworthy, Ford, Synge, Forster, and Lawrence. Critical analysis of selected texts,

with discussion of techniques and ideas. 8:00-9:20. One course (3 graduate units). *Smith*

331. *Emerson*. A study of Emerson's ideas as reflected in selected examples of his essays and poems. 9:40-11:00. 3 units. *Gohdes*

Second Term

56. *Representative British Writers*. Novels by Fielding (*Joseph Andrews*), Dickens (*Great Expectations*), and selections from the poetry of Pope, Wordsworth, Keats, and Yeats. 8:00-9:20. One course. *Mel-loun*

176. *American Literature since 1915*. Poetry, fiction, drama, and critical prose from Stein, Anderson, O'Neill, Hemingway, and Faulkner to contemporary authors such as Malamud and R. Lowell. (Not open to students who have taken 138.) 9:40-11:00. One course. *Duffey*

221. *English Literature of the Early Nineteenth Century*. The Romantic poets and prose writers from Scott to the early Carlyle, with special attention to Wordsworth, Coleridge, and Keats. 8:00-9:20. One course (3 graduate units). *Stevenson*

230. *American Literature, 1800-1865*. The writers emphasized are Poe and Melville. 11:20-12:40. One course (3 graduate units). *Turner*

235. *American Literature since 1920*. Selected fiction from Gertrude Stein to the present. 8:00-9:20. One course (3 graduate units). *Duffey*

239. *Shakespeare*. The plays. 11:20-12:40. One course (3 graduate units). *Williams*

374. *Studies in American Humor*. The native tradition in the Down-East humorists and the humorists of the Old Southwest, in Mark Twain and his contemporaries, and afterward. 9:40-11:00. 3 units. *Turner*

Forestry

Professor Charles W. Ralston, *Dean of the School of Forestry* (213 Biological Sciences Building, West Campus); Associate Professor Kenneth R. Knoerr, *Director of Graduate Studies* (309 Biological Sciences Building, West Campus)

Qualified students may engage in thesis research in certain branches of forestry during the Summer Session with the approval of the instructor concerned and the Dean of the School of Forestry, or of the Director of Graduate Studies in the case of work taken through the Graduate School.

357. *Research in Forestry*. Open to students whose research programs for the M.F. or D.F. degree have been approved by the Dean of the School of Forestry and the instructor responsible for directing the research and whose programs for the A.M., M.S., or Ph.D. degree have been approved by the Director of Graduate Studies and the instructor in charge. (Credits and schedule to be arranged.) June 9-August 22. 2 to 12 units.

(Not more than one semester hour of credit per week for full-time schedule or one semester hour each two weeks for half-time schedule.) (Consult courses 301-302 in the *Bulletin of the School of Forestry* for letter designation of branches of forestry in which research is to be conducted.)
Staff

Geology

Associate Professor S. Duncan Heron, Jr., *Chairman* (118 Science Building, East Campus); Associate Professor Orrin H. Pilkey, *Director of Graduate Studies* (05 Science Building, East Campus); Associate Professor William J. Furbish, *Director of Undergraduate Studies* (104 Science Building, East Campus)

The class in Geology 1, Term I, will begin on June 17 and continue through July 15. The class in Geology 2, Term II, will begin on July 20 and continue through August 14. Students who wish to avoid paying a late registration fee must have their registration completed in advance of these dates. For registration dates see General Registration on page 26 of this *Bulletin*.

First Term

1. *Physical Geology*. Physical processes acting on the earth, composition of the earth, and earth structures. Lectures or recitations, 8:00-10:30 Monday through Friday; laboratory 1:00-3:00 Monday through Thursday. June 17-July 15. One course. *Heron*

Second Term

2. *Historical Geology*. History of the earth, its physical development, and the geological evolution of life. Lectures or recitations, 8:00-10:30 Monday through Friday; laboratory, 1:00-3:00 Monday through Thursday. July 20-August 14. One course. *Lynts*

205. (Beaufort). *Geological Oceanography*. The study of the broad geologic aspects of the ocean basins, including origin, bottom physiography, sediment distribution, and sedimentary processes. Observations in the field will be emphasized and will include training in sampling procedures for both shallow and deep water. (This course is not open to students who have completed Geology 206.) Two courses (6 graduate units). *Pilkey*

German

Professor Herman Salinger, *Chairman and Director of Graduate Studies* (106 Language Building, West Campus); Lecturer Helga Bessent, *Director of Undergraduate Studies* (02 Language Building, West Campus)

The work in German 1, 2, 63, and 64 will be coordinated with listening and oral practice in the language laboratory which students in German classes will be privileged to attend.

First Term

1. *Elementary German*. Practice in understanding, speaking, reading, and writing. Classroom techniques are combined with those of the language laboratory. 11:20-12:40; and on Tuesdays and Fridays, 2:00-3:20. One course. *Bessent*

63. *Intermediate German*. Grammar review and composition; reading of short stories, novels, and poems. Prerequisite: German 1-2, or two units of high-school German. 9:40-11:00. One course. *Bessent*

64. *Intermediate German*. Continuation of German 63. Prerequisite: German 63 which may be taken concurrently. 11:20-12:40. One course. *Alt*

191. *Independent Study*. Directed reading and research. Open only to qualified students in the junior year, by permission of the Department. Hours to be arranged. One course. *Salinger*

193. *Independent Study*. Directed reading and research. Open only to qualified students in the senior year, by permission of the Department. Hours to be arranged. One course. *Salinger*

Graduate Reading Course. An intensive course in German to develop rapidly the ability to read technical German in several fields. For graduate students only. 9:40-11:00. No degree credit. *Klabes*

Second Term

2. *Elementary German*. Practice in understanding, speaking, reading, and writing. Classroom techniques are combined with those of the language laboratory. Prerequisite: German 1 or equivalent. 11:20-12:40 and on Tuesdays and Fridays, 2:00-3:20. One course. *Novak*

Health and Physical Education

Edmund M. Cameron, *Director, Trinity College and College of Engineering* (109 Indoor Stadium, West Campus); Professor J. A. Friedrich, *Chairman, Health and Physical Education* (107 Card Gymnasium, West Campus)

First Term

PE 182. *The Administration of Health and Physical Education in Secondary Schools*. Presents the everyday problems that arise in the experience of the teacher of health and physical education. Open to juniors and seniors. 11:20-12:40. One course. *Davies*

PE 190. *Protective Practices in Physical Education*. Training and conditioning of athletic teams and the prevention, diagnosis, and treatment of athletic injuries. Gymnasium. 8:00-9:20. One course. *Davis*

History

Professor Joel Colton, *Chairman* (235 Allen Building, West Campus); Professor John J. TePaske, *Director of Graduate Studies* (237 Allen Building, West Campus); Associate Professor Charles R. Young, *Director of Undergraduate Studies* (102 West Duke Building, East Campus)

For admission to candidacy for a master's degree in history, the student must present a total of twelve semester hours of prior work in history, of which at least six must be in American history if he plans to take his major work in that field. Candidates for the degrees of Master of Arts and Master of Arts in Teaching are required to complete at least three hours of seminar work and are strongly urged to enroll for this work after they have attended one Summer Session term. (See courses numbered 300 or above.)

First Term

51. *A History of European Civilization*. Major problems in the development and world impact of European civilization to about 1815, critical evaluation of historical interpretations, and investigation of history from primary sources. 11:20-12:40. One course. *Cell*

53. *Greek History* (Also Classical Studies 53.) The political and intellectual history of the Hellenes from earliest times to the death of Alexander the Great. 8:00-9:20. One course. *Oates*

54. *Roman History*. (Also Classical Studies 54.) The Roman republic and empire to the Council of Nicaea. 9:40-11:00. One course. *Oates*

91. *The Development of American Democracy to 1865*. This course is a study of trends vital to an understanding of the United States today. The main theme is the development of American democracy. Problems of foreign policy, the growth of capitalism, political practices, social reform, and conflicting ideals are considered in relation to this main theme. 9:40-11:00. One course. *TePaske*

118. *European Imperialism and Colonialism*. The new imperialism and the modernization of post-colonial societies. 8:00-9:20. One course. *Cell*

218. *Europe Since 1870*. International relations since the Franco-German War: selected topics. 11:20-12:40. One course (3 graduate units). *Viault*

220. *The Black Experience in the United States*. Origins to the present. 9:40-11:00. One course. (3 graduate units). *Brewer*

265. *Modern South America*. 8:00-9:20. One course (3 graduate units). *TePaske*

Second Term

52. *A History of European Civilization*. A continuation of History 51, 1815 to the present. 11:20-12:40. One course. *Lerner*

92. *The Development of American Democracy, 1865 to the Present*. The emphasis is on the emergence of contemporary problems. 9:40-11:00. One course. *Durden*

162. *History of Russia, 1917 to the Present*. 8:00-9:20. One course. *Dunn*

239. *History of Socialism and Communism*. Origins and development of socialist and communist movements. 9:40-11:00. One course (3 graduate units). *Lerner*

252. *Recent European History*. Political, social, and economic developments since 1929. 11:20-12:40. One course (3 graduate units). *Colton*

278. *Reform and Politics in Nineteenth Century U.S.A., 1861-1900*. 8:00-9:20. One course (3 graduate units). *Durden*

302. *Seminar in Historical Investigation*. A course designed to introduce teachers, current and prospective, to the processes of historical research through investigation of particular instances. The topics selected for investigation vary with the needs and interests of each individual. 2:00-3:20 or at an hour to be arranged. 3 units. *Colton*

Hospital Administration

Professor Charles H. Frenzel, *Director of the Graduate Program in Hospital Administration* (234B Baker House); Assistant Professor Donald S. Smith, II, *Coordinator of Graduate Studies* (234B Baker House)

Second Term

201. *History and Deveopment of Hospitals and Other Health Agencies*. This course is designed to give the student a broad concept of the health field. It includes a study of the evolution of health institutions; analysis of medical care organizations in the United States; the emergence of the health professions. Permission of the instructor required. 3 units. *Smith*

Management Sciences

Professor Louis D. Volpp, *Chairman* (115 Social Science Building, West Campus); Professor Thomas F. Keller, *Director of Graduate Studies* (203 Social Science Building, West Campus); Professor David C. Dellinger, *Director of Undergraduate Studies* (209 Social Science Building, West Campus)

First Term

60D. *Probability and Statistics for Decision Problems*. Fundamentals of probability theory, classical and Bayesian statistical analysis, and elementary decision theory. The application of statistical analysis to decision problems is stressed. Topics include sample spaces, probability distributions, combinations and permutations, functions of random variables, Bayes Theorem, Central Limit Theorem, estimation, analysis of variance, regression and correlation analysis, utility, risk, uncertainty, and decision criteria. Prerequisite or co-requisite: Math 22 or 32. 8:00-9:20. One course. *Staff*

140D. *Operations Research*. Introduction to the use of mathematical models in the analysis of decision problems. Topics include mathematical programming, game theory, dynamic programming, queuing theory, simulation, and inventory models. Use of electronic computer will be included. Prerequisite: Management Sciences 50, 60; co-requisite Math 51. 11:20-12:40. One course. *Staff*

Mathematics

Professor Seth L. Warner, *Chairman* (135 Physics Building, West Campus); Associate Professor David A. Smith, *Director of Graduate Studies* (135 Physics Building, West Campus); Professor Francis G. Dressel, *Director of Undergraduate Studies* (135 Physics Building, West Campus)

Graduate students are invited to consult with the Director of Graduate Studies concerning their programs.

First Term

31. *Introductory Mathematical Analysis*. Language of logic and sets, continuity, differentiation, integration, the fundamental theorem of the calculus. Prerequisite: three units of college preparatory mathematics. 11:20-12:40. One course. *Staff*

263. *Universale Algebra*. Algebraic structures; free algebras and the word problem; varieties of algebras; applications. Prerequisite: Mathematics 236. 11:20-12:40. One course (3 graduate units). *Smith*

Second Term

32. *Introductory Mathematical Analysis*. Elementary and transcendental functions, sequences, series, Taylor's formula. Prerequisite: Mathematics 31. 11:20-12:40. One course. *Staff*

51. *Introduction to Digital Computation*. Flow charts; binary arithmetic; and assembly language; program structures, subroutines, linkages, recursion; data structures, arrays, polynomials; an algorithmic language; numerical linear algebra, matrix inversion, linear programming, estimation of parameters by criteria of Gauss and Chebyshev. (A fee of \$8.00 is charged for this course.) Prerequisite: three units of college preparatory mathematics. 8:00-9:20. One course. *Staff*

204. *Geometry for Teachers*. Metric and synthetic approaches to plane and solid geometry; affine geometry; an algebraic model of Euclidean geometry. 8:00-9:20. One course (3 graduate units). *O'Neill*

219. *Advanced Modern Algebra*. Fields, vector spaces, and groups; Galois theory; theory of equations. Prerequisite: some familiarity with modern algebra and linear algebra. 11:20-12:40. One course (3 graduate units). *Warner*

295. *Mathematical Foundations of Statistical Inference*. Inference-theoretic approach to hypothesis testing, decision making, and estimation; Neyman-Pearson fundamental lemma; uniformly most powerful tests; Fisher's information and sufficiency; invariance and unbiasedness. Prerequisite: Mathematics 275, or consent of instructor. 9:40-11:00. One course (3 graduate units). *Herr*

Mathematics and Science Institute

Botany 214. *Survey of Modern Botany II*. 3 units (graduate)

Botany 235, 236. *Field Botany*. 6 units (graduate)

Zoology 225, 226. *Field Zoology*. 6 units (graduate)

Mathematics 209. *Fundamental Concepts in Geometry*. 3 units (graduate)

Mathematics 271. *Introductory Topology*. 3 units (graduate)

Mathematics 215. *Intermediate Analysis*. 3 units (graduate)

Chemistry 214. *Advanced Chemistry for Teachers*. 4 units (graduate)

Chemistry 217. *Inorganic Chemistry*. 3 units (graduate)

Chemistry 216. *Nuclear Chemistry*. 3 units (graduate)

Microbiology

325. *Medical Mycology*. A lecture and laboratory course with emphasis on those fungi which cause disease in man and animals. The course

includes practical laboratory work with materials from patients in Duke Hospital and those sent to the Duke Fungus Registry from outside sources. June 29-July 25, 1970. Lecture daily (Monday-Saturday), 8:00-9:00 a.m.; laboratory (Monday-Friday), 9:00-12:00 and 1:30-4:30 p.m.; Saturday 9:00-12:00. 4 units. *Conant*

Pathology

Professor Thomas D. Kinney, *Chairman* (M301, Davison, West Campus); Professor Benjamin F. Trump, *Director of Graduate Studies* (M263, Davison, West Campus)

First Term

M 357. *Research*. Hours to be arranged. *Staff*

M 361. *Advanced General Pathology*. See *Bulletin of the Graduate School* for description. 6 units. *Staff*

M 363. *Seminar in Electron Microscopy*. For description, see *Bulletin of the Graduate School*. 1 unit. *Trump*

Second Term

M 357. *Research*.

M 362. *Second part of M 361. Advanced General Pathology*.

M 363. *Seminar in Electron Microscopy*. See above.

Philosophy

Professor Paul Welsh, *Chairman* (203D, West Duke Building, East Campus); Professor W. Bernard Peach, *Director of Graduate Studies* (201B West Duke Building, East Campus); Assistant Professor Richard Aquila, *Director of Undergraduate Studies* (203B West Duke Building, East Campus)

First Term

48. *Logic*. A study of the conditions of effective thinking and clear communication. Examination of the basic principles of deductive reasoning. 9:40-11:00. One course. *Kalke*

94. *History of Philosophy: Modern*. An introduction to philosophy through the study of some of the major writings of modern philosophers from Descartes to Kant. 11:20-12:40. One course. *Peach*

Second Term

41. *Knowledge, Fact, and Value*. An introduction to philosophy through the study of some of its main problems. These include the nature of truth and fact, of evidence, faith and knowledge, and of the fundamental categories descriptive of the universe. 11:20-12:40. One course. *Aquila*

Physics

Professor Henry A. Fairbank, *Chairman* (118 Physics Building, West Campus); Professor Lawrence E. Evans, *Director of Graduate Studies* (213 Physics Building, West Campus); Professor Horst Meyer, *Director of Undergraduate Studies* (0028 Physics Building, West Campus)

Classes in Physics 51, Term I, will begin on June 17 and continue through July 15. Classes in Physics 52, Term II, will begin July 20 and continue through August 14. Students who wish to avoid paying a late registration fee must have their registration completed in advance of these dates. For registration dates see General Registration on page 26 of this *Bulletin*.

First Term

51. *General Physics*. This course treats the basic principles of general physics in a more quantitative manner than Physics 1-2. It meets in a thorough way the physics requirement for entrance into the study of either medicine or engineering, and is well suited for the general science student. This course is not open for credit for students who have completed Physics 1-2. Lecture and recitation daily, 8:30-9:50 and 10:10-11:30; laboratory four days per week, 1:00-4:00. Prerequisites: Mathematics 21, 22 or equivalent. One course. *Wheeler*

353X. *Thesis Seminar*. Students who are properly qualified may carry on research work under direction. Credits and hours to be arranged. *Staff*

Second Term

52. *General Physics*. A continuation of Physics 51. Prerequisite: Physics 51. Lecture and recitation daily, 8:30-9:50 and 10:10-11:30; laboratory four days per week, 1:00-4:00. One course. *Wheeler*

Political Science

Professor John H. Hallowell, *Chairman* (215 Old Perkins Library, West Campus); Professor M. Margaret Ball, *Director of Graduate Studies*

(2114 Campus Drive); Professor Norman C. Thomas, *Director of Undergraduate Studies* (215 Old Perkins Library)

First Term

61. *The American Political System*. An analysis of the principles and institutions of government and politics in the United States. 9:40-11:00. One course. *Thomas*

246. *Public Administration and Public Policy*. An analysis of the roll of the administrative official as a policy-maker in modern American politics. Consideration is given to the problems which public officials encounter, the factors which influence their actions and means of rationalizing policy-making behavior. 8:00-9:20. One course (3 graduate units). *Thomas*

Second Term

109. *State and Local Government Today*. Problems in state, county, and city government: administration of services such as education, public welfare, law enforcement, intergovernmental relationships, administrative reorganization, methods of popular control, and the reconstruction of state and local government to meet present-day needs. 9:40-11:00. One course. *Leach*

231. *American Political Theory*. An analysis of the main currents in American political thought from colonial beginnings to the present day, with emphasis upon the development of liberalism in America. 11:20-12:40. One course (3 graduate units). *Leach*

Psychology

Professor Irving E. Alexander, *Chairman* (224 Building 9, West Campus); Associate Professor Gregory R. Lockhead, *Director of Graduate Studies* (242 Building 9, West Campus); Associate Professor Cliff W. Wing, Jr., *Director of Undergraduate Studies* (316 Building 9, West Campus)

Details concerning the program in studies in Psychology may be obtained from the Director of Graduate Studies in Psychology.

First Term

93. *Biological Basis of Behavior*. Behavior as a product of evolution and the role of behavior in species survival. Neural and endocrine factors in reproduction, hunger, thirst, emotion, and intelligence. Heredity-environment in the development of behavior. 8:00-9:20. One course. *Lockhead*

94. *Personality*. Representative theories of personality, from Freud to the present, emphasizing problems of normal personality structure,

dynamics, development, and assessment. Not open to students who have had Psychology 116. 9:40-11:00. One course. *Costanzo*

211. *The Problem Child* (Also Education 211.) Study of problem behavior and adjustment in children with emphasis on the causes and treatment of conduct and neurotic disorders of the maladjusted child. Particular attention will be paid to mental hygiene principles in the handling of problem children in school and home. 9:40-11:00. One course (3 graduate units). *Gehman*

253. *Personality Development*. A survey of behaviors and concepts relating to personality functioning with special emphasis on infancy, childhood, and adolescence. 8:00-9:20. One course (3 graduate units). *Staff*

271A. *Seminar in Selected Problems*. Hour to be arranged. One course (3 graduate units). *Clinical Staff*

303. *Research*. Students who are properly qualified may carry on research work under direction. Hours and credits to be arranged. *Staff*

Second Term

95. *Developmental Psychology*. Theory and research on growth and behavior from infancy to adolescence; special emphasis on personality and cognitive development. 9:40-11:00. One course. *Coie*

271B. *Selected Problems*. To be arranged. One course (3 graduate units). *Clinical Staff*

304. *Research*. Students who are properly qualified may carry on research work under direction. Hours and credits to be arranged. *Staff*

Religion

Professor Thomas A. Langford, *Chairman* (118 Gray Building, West Campus); Professor Franklin W. Young, *Director of Graduate Studies* (304 Divinity Building, West Campus); Assistant Professor Harry B. Partin, *Director of Undergraduate Studies* (118A Gray Building, West Campus)

First Term

50. *Old Testament*. A comprehensive survey of the books of the Old Testament. Historical, literary, and theological investigations constitute the emphasis of the study. 8:00-9:20. One course. *Wintermute*

55. *The Religion of the Bible*. An historical, cultural, and theological study of the Old and New Testaments. 9:40-11:00. One course. *Ricketts*

57. *Introduction to the History of Religion*. A historico-religious study of primitive religion, Hinduism, Buddhism, Islam, and some other religions. 11:20-12:40. One course. *Bradley*

188. *Recent Literature and Its Religious Implications*. Religious elements in recent literature. 9:40-11:00. One course. *Kort*

Second Term

52. *The New Testament*. A comprehensive survey of the books of the New Testament. The literature is examined in the light of its origins, development and content of thought. 8:00-9:20. One course. *Charlesworth*

130. *Christian Ethics*. A systematic study of the ethical implications of Biblical religion, the historical development of the Christian ethic and the ethical dimensions of various aspects of contemporary social life, such as poverty, race and war. 9:40-11:00. One course. *Clark*

142. *Myth and Symbol*. Historical and phenomenological study of religious myth and symbol, Christian and non-Christian. The nature and function of myth in religion; types of myths, with particular attention to cosmogonic myths. The nature of religious symbols; structural and comparative study of selected symbols. 11:20-12:40. One course. *Partin*

Romance Languages

Professor John Fein, *Chairman* (205 Building 5, West Campus); Associate Professor Thomas H. Cordle, *Director of Graduate Studies* (303 Building 5, West Campus)

French

First Term

1. *Elementary French*. Introduction to understanding, speaking, and writing French. Audio-lingual techniques are combined with required recording-listening practice in the language laboratory. 9:40-11:00, and Mondays and Thursdays 2:00-3:20. One course. *Bryan*

63. *Intermediate French*. Intensive classroom and laboratory practice in spoken and written patterns. Readings in contemporary literature. Prerequisite: French 1-2 or two years of high-school French. 9:40--11:00, and Mondays and Thursdays 2:00-3:20. One course. *Ripley*

Second Term

2. *Elementary French*. Continuation of 1. 9:40-11:00, and Mondays and Thursdays 2:00-3:20. One course. *Fong*

64. *Intermediate French*. Continuation of 63. 9:40-11:00, and Mondays and Thursdays 2:00-3:20. One course. *Frasure*

Spanish

First Term

1. *Elementary Spanish*. Introduction to understanding, speaking, and

writing Spanish. Audio-lingual techniques are combined with required recording-listening practice in the language laboratory. 8:00-9:00, also 11:30-12:30. One course. *Fein*

63. *Intermediate Spanish*. Intensive classroom and laboratory practice in spoken and written patterns. Readings in contemporary literature. Prerequisite: Spanish 1-2 or two years of high-school Spanish. 9:40-11:00, and Mondays and Thursdays 2:00-3:20. One course. *Torre*

Second Term

2. *Elementary Spanish*. Continuation of 1. 8:00-9:00, also 11:30-12:30. One course. *Cypess*

64. *Intermediate Spanish*. Continuation of 63. 9:40-11:00, and Mondays and Thursdays 2:00-3:20. One course. *Cox*

Slavic Languages and Literatures

Associate Professor Magnus J. Krynski, *Chairman* (314 Language Building, West Campus)

First Term

100. *Russian Short Fiction*. Thematic and structural analysis of short fictional works of Pushkin, Gogol, Dostoevsky, Turgenev, Leskov, Tolstoy, and Chekhov. 9:40-11:00. One course. *Jezierski*

191. *Independent Study*. Directed study in the Russian language. Open only to highly qualified students by permission of the Department. Hours to be arranged. One course. *Jezierski*

Second Term

192. *Independent Study*. Directed study in the Russian language. Open only to highly qualified students by permission of the Department. Hours to be arranged. One course. *Staff*

Sociology and Anthropology

Professor Edward A. Tiryakian, *Chairman* (268I Sociology-Psychology Building, West Campus); Professor Joel Smith, *Director of Graduate Studies* (332 Sociology-Psychology Building, West Campus); Associate Professor Donald F. Roy, *Director of Undergraduate Studies* (273 Sociology-Psychology Building, West Campus)

The Department of Sociology offers graduate work leading to the A.M.

and Ph.D. degrees. Before undertaking advanced work in this Department, a student must have completed a minimum of 12 semester hours of approved preliminary courses in the field, and 12 additional semester hours in the field or in related work. A student who is deficient in the minimum required work will be asked to take additional undergraduate courses agreed upon in conference with the Director of Graduate Studies.

Candidates for advanced degrees in sociology usually take minor work in psychology, economics, political science, education, history, or religion. Detailed requirements for the minor work, and for majors in other departments who wish to present sociology as minor work, may be obtained from the Director of Graduate Studies.

Sociology

First Term

91. *Introduction to Sociology: Concepts and Procedures.* Concepts and procedures of sociology and illustrations of their use in understanding specific areas of social life. Open to freshmen 11:20-12:40. One course. *Fenton*

247. *Community and Society.* This course seeks to provide a frame of reference for the analysis and ordering of facts pertaining to the diverse cultures of the world, the State, the world community, the Great Society, and news, mass behavior, social problems, races, and classes. 9:40-11:00. One course (3 graduate units). *Thompson*

255. *Race and Culture.* A comparative study of race relations in world perspective developed around such themes as race and personal identity, the geography and ecology of race relations, the idea of race, and race conflict. 11:20-12:40. One course (3 graduate units). *Thompson*

Second Term

145. *Urban Sociology.* Historical, demographic, and ecological materials are used to study urban society with respect to its institutions, interaction patterns, differentiation, integration, disorganization, and decentralization. 9:40-11:00. One course. *Magubane*

146. *Industry and Society.* A study of industrial institutions in their interrelationships with other forms of social behavior in the broad cultural setting of Western civilization. Attention will center upon analysis of specific social problems resulting from the impact of industrial change. 11:20-12:40. One course. *Fenton*

241. *Social Stratification.* The nature of hierarchical and vertical differentiation in the economic, political, and prestige structures in modern societies. The interrelationship of class, status, and power strata and their influence on social institutions, personality structure, and group and

individual behavior. 11:20-12:40. One course (3 graduate units).
Magubane

Anthropology

First Term

134. *Political Anthropology*. Comparative study of conflict and political action. Decision-making as related to social structure and cultural values. Stateless, emergent, and underdeveloped societies. 8:00-9:20. One course.
O'Barr

222. *Topics in African Anthropology*. Current research problems in African anthropology, illustrated by a study of tribal societies, in terms of contemporary theories about culture and society. 9:40-11:00. One course (3 graduate units). *O'Barr*

Second Term

94. *Cultural Anthropology*. A study of the dynamics of culture and society; form and function of social institutions. Emphasis is upon primitive societies. 8:00-9:20. One course. *Fitzgerald*

280. *Seminar in Selected Topics: Education and Culture*. A cross-cultural approach to education, focusing upon non-Western societies. 9:40-11:00. One course (3 graduate units). *Fitzgerald*

Zoology

Professor Donald J. Fluke, *Chairman* (227 Biological Sciences Building, West Campus); Professor John R. Gregg, *Director of Graduate Studies* (047 Biological Sciences Building, West Campus); Assistant Professor Roger W. Doyle, *Director of Undergraduate Studies* (337 Biological Sciences Building, West Campus)

All classes in zoology are offered at the Duke University Marine Laboratory at Beaufort, North Carolina (Term I, June 9-July 15; Term II, July 17-August 22). Students who wish to avoid paying a late registration fee must have their registration completed in advance of these dates. For registration dates see General Registration, page 26 of this *Bulletin*. For detailed instructions and further information on these offerings see the *Bulletin of Duke University Marine Laboratory*.

To undertake study toward an advanced degree in zoology, a student should have completed an undergraduate major in zoology or its equivalent. This normally amounts to twenty-four or more hours of course work distributed among various fields of zoology. The Department recognizes the trend in modern biology toward interdisciplinary research, and part

of the zoology requirements may be replaced by advanced work in chemistry, mathematics, physics.

Required work for the A.M. degree ordinarily includes twelve units of advanced course work in zoology, six units of course work in a minor department, and an additional six units of advanced course work in the major or minor department, or in other pertinent departments. Furthermore, an acceptable thesis is necessary for the fulfillment of the degree requirements.

Candidates for the Ph.D. degree are expected to be broadly trained zoologists. The program of each candidate is determined by a committee which reviews previous training and sets the specific requirements to be made. Normally the program includes graduate courses in several fields of zoology, courses in the minor subject, wide reading in science in general and in biology in particular, research, and dissertation based on original work. Minor work is available in many fields, including anatomy, biochemistry, botany, chemistry, physics, physiology, and psychology.

First Term (Durham Campus)

353. *Research.* Hours to be arranged. 2-6 units. *Staff*

First Term (Duke Marine Laboratory, Beaufort)

203. *Marine Ecology.* A study of marine animals in relation to environment. Consideration of environmental factors, succession, rhythms, communities, intraspecific and interspecific relations, productivity, conservation problems, etc., concerned with animal life in the ocean. Lectures, reviews, conferences, field and laboratory work. Two courses (6 graduate units). *Sutherland*

214. *Biological Oceanography.* Composition in time and space of marine biosphere in relation to descriptive marine chemistry, physics, and geology. Some work at sea aboard the research vessel. Prerequisites: a course in invertebrate zoology, ecology, marine biology or an appropriate equivalent; chemistry through organic; one year of physics and mathematics. Two courses (6 graduate units). *Barber*

240. *Chemical Oceanography.* Physico-chemical properties of seawater, major and minor constituents, trace elements, dissolved gases, the carbon dioxide system, dissolved organic constituents, the nutrient systems and their biochemical and physio-chemical aspects, dynamic equilibria in the chemical systems in the oceans. Laboratory work and field trips to collect data. Prerequisites: one year of physics, mathematics through calculus, a year of analytical chemistry or physical chemistry; an introductory course in general oceanography or a course in physical oceanography or permission of the instructor. Two courses (6 graduate units). *Stefansson*

353. *Research.* Hours to be arranged. 2-6 units. *Staff*

Second Term (Durham Campus)

354. *Research*. Hours to be arranged. 2-6 units. Staff

Second Term (Duke Marine Laboratory, Beaufort)

250. *Physiological Ecology of Marine Animals*. A study of the physiological responses of marine animals in relation to certain environmental factors and evolution. Animals representing numerous phyla and from various habitats are studied. Prerequisite: Zoology 151 or equivalent. Two courses (6 graduate units). Roberts

274. *Marine Invertebrate Zoology*. A study of invertebrate animals that occur in the Beaufort region. A number of field trips will be made to a variety of habitats to study, collect, and classify animals in their natural environment. The structure and habits of living invertebrates, as well as their behavior under certain experimental conditions, will be studied in the laboratory. Two courses (6 graduate units). Naylor

354. *Research*. Hours to be arranged. 2-6 units. Staff



Information to Accompany Duke University Summer Session Residence Hall Application

Application for room and apartment reservations and all correspondence concerning reservations should be addressed as appropriate to: Department of Housing Management, House D, Room 101-R, Duke Station, Durham, North Carolina, or Business Manager, Duke University Marine Laboratory, Beaufort, North Carolina.

Room rent is payable in advance. No deductions from grants, scholarships, etc., can be made to pay rents.

Room and apartment assignments will be made only upon the applicant's admission to the Summer Session, as certified by the Summer Session Office, and *upon payment of full rent*. Applicants who expect to be in residence for longer than one term of the Summer Session are urged to make advance reservation for the entire period and thus avoid, to the extent that housing arrangements make it practicable, the necessity of moving from one room to another during the full term of residence.

See page 22 of Summer Session *Bulletin* for information concerning refund of fees.

When no single rooms are available, a person requesting a single room will be assigned a double room alone and charged room rent as stated on the next page.

Requests for specific roommates will be complied with, provided the completed application forms of both applicants indicate mutual agreement and are on hand in the Department of Housing Management at the time of room assignment. If the applicant requests a double room but gives no preference of roommate, the Department of Housing Management will try to assign a roommate. It is understood, however, that the responsibility for getting and keeping a roommate rests with the applicant; otherwise it will be necessary for him/her to move to a single room or to make a financial adjustment.

*Please Retain This Sheet
See Reverse*

Residence Hall Rooms—Rates

*Edens Quadrangle and Few Quadrangle**

Single

10 weeks.....	\$170.00
9 weeks.....	153.00
8 weeks.....	136.00
5 weeks.....	85.00
4 weeks.....	68.00
1 week	17.00

Double

10 weeks.....	\$125.00
9 weeks.....	112.50
8 weeks.....	100.00
5 weeks.....	62.50
4 weeks.....	50.00
1 week	12.50

*Not available for graduate men. Space limited for graduate women.

Other Residences (Graduate Center and West Campus Residences)

Single

10 weeks.....	\$110.00
9 weeks.....	99.00
8 weeks.....	88.00
5 weeks.....	55.00
4 weeks.....	44.00
1 week	11.00

Double

10 weeks.....	\$ 87.50
9 weeks.....	78.75
8 weeks.....	70.00
5 weeks.....	43.75
4 weeks.....	35.00
1 week	8.75

Duke Marine Laboratory

5 weeks.....	\$45.00 per person
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Space in Town House Apartments —Graduate Women

PER WEEK—

\$18.00 each student (3 to an apartment)
\$27.00 each student (2 to an apartment)
(Not assigned for less than 4 weeks)

Double rooms as singles (occupied by one person)

10 weeks.....	\$140.00
9 weeks.....	126.00
8 weeks.....	112.00
5 weeks.....	70.00
4 weeks.....	56.00
1 week	14.00

Refund of Room Rent

There will be a refund of room rent upon the following conditions:

- a. When notification for room cancellation is received by the Department of Housing Management on or before fifteen (15) days prior to the registration date of the Summer Session term, full room rent will be refunded.
- b. When notification for room cancellation is received between the fifteen (15) days prior to registration date and the first four class days, 80 percent of the room rent will be refunded.
- c. When notification for room cancellation is received after the first four days of Summer Session term, 70 percent of

Duke University Summer Session: Application For Housing

Please Print

Name..... Male ☐ Graduate ☐
Female ☐ Undergraduate ☐

Mailing Address.....
Permanent Address.....

Present position.....
Anticipated fields of study: (1).....(2).....

Accommodations Desired

Room: Single Double; Double as Single; Air-conditioned: Yes No
(Undergraduates and Graduate Women)

Town House Apts: Unaccompanied Women.....; Family
(Available for women graduate students and families only) No. Persons

Name of roommate preferred:
Number of weeks enrolled.....Date of arrival at Duke..... At Beaufort.....

Enclosed is check/money order payable to *Duke University* in amount of \$.....
(Total payment required with application. No assignments will be made until full remittance is received. Please ensure that your remittance covers the specific number of weeks you will be in residence.)

.....
Signature

Mail completed application and check as appropriate to:
Department of Housing Management
Duke University, Duke Station
Durham, North Carolina 27706

Business Manager
Duke University Marine Laboratory
Beaufort, North Carolina

Directions to Summer Session Applicants

All applicants for Summer Session courses who are not now in residence at Duke University must fill out accurately and in detail the form below and return it to the Director of the Summer Session. Preference in enrollment will be given to persons returning the form promptly, but a place in a particular course cannot be assured until all fees are paid. Undergraduates or graduates who are enrolled in a university or college other than Duke University and who are seeking to transfer summer session credits to the college in which they are matriculated should request a course approval form to be certified by their dean or registrar. Graduate students are reminded that credit earned as an unclassified graduate student cannot be applied toward an advanced degree at Duke University. Persons applying for admission to the Graduate School of Duke University should write the Dean of the Graduate School for the necessary forms in addition to completing the form below.

No. Approved Date.....

Application for Enrollment in the Duke University Summer Session

Mr., Mrs., Miss.....
(Please Print)

Street Address, Rural Route, or P. O. Box.....

Post Office..... State..... Zip Code.....

Social Security No.....

Please register me in the following courses listed in the Summer Session
Bulletin.

Department	No. of Course	Title of Course
.....		
.....		
.....		

Name and address of high school from which you graduated.....

Have you attended a college? Yes..... No.....

Name and address of college.....

Highest degree held.....

Are you a candidate for a degree? Yes..... No.....

If yes, for which degree?.....

Check the one below which indicates your present University status.
(Do not indicate a status in a Duke University School or College unless
you have already been admitted to that School or College.)

- | <i>Undergraduate credits</i> | <i>Graduate credits</i> |
|--|--|
| ☐ Trinity College (men) | ☐ Graduate School |
| ☐ The Woman's College | ☐ Divinity School |
| ☐ School of Engineering | ☐ School of Forestry |
| ☐ Special or unclassified | ☐ Special or unclassified |
| ☐ Credits for transfer | ☐ Credits for transfer |

Are you applying for admission to the Graduate School?.....
Are you at present a college student?..... If so, where?.....
..... What class?
Are you a full-time teacher?.....
If so, give name and address of school.....
Teaching Position:.....
 Elementary:.....
 Secondary:.....
 Administrator:.....
 Supervisor:.....
Have you attended previous Summer Sessions at Duke: Yes.....
Years.....No.....
Do you wish credit certified to some agency or school?
Yes:.....No:.....
If yes, please give exact name and address of agency or school.
.....
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1970

	S	M	T	W	T	F	S		S	M	T	W	T	F	S	
JAN.					1	2	3		JULY				1	2	3	4
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	25	26	27	28	29	30	31			26	27	28	29	30	31	
FEB.	1	2	3	4	5	6	7		AUG.							1
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MAR.	1	2	3	4	5	6	7		SEP.			1	2	3	4	5
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	26	27	28	29	30					25	26	27	28	29	30	31
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	31															
JUNE		1	2	3	4	5	6		DEC.			1	2	3	4	5
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	28	29	30							27	28	29	30	31		

BULLETIN OF DUKE UNIVERSITY

The Graduate School

1970



Annual Bulletins

- For *Bulletin of Information for Prospective Students*, apply to Office of Undergraduate Admissions, Duke University, Durham, N. C. 27706
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 - For *Bulletin of the Physician's Assistant Program*, apply to the Director, Physician's Assistant Program, Duke University, Durham, N. C. 27706
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Cover design is adapted from a photograph of a carving in the entrance to Crowell Quadrangle.

BULLETIN OF DUKE UNIVERSITY

The Graduate School
1970-1971

Durham, North Carolina 1970

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No. 5A

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Calendar of the Graduate School*

Summer Session 1970

April

- 13-14 Monday, Tuesday—Advanced registration for current students for 1970 Summer Session (and for fall semester, 1970).

May

- 12 Tuesday—Final date for completing application for admission in the Summer Session, first term.

June

- 9 Tuesday—Registration of students for Summer Session, first term.
10 Wednesday—Instruction begins for Summer Session, first term.
19 Friday—Final date for completing application for admission in the Summer Session, second term.

July

- 8 Wednesday—Examination for students electing English for a foreign language requirement; room and hours to be announced.

*Students entering the Graduate School for the first time and those former students who were not registered in the previous semester may expect to receive the necessary registration materials prior to registration time only if they have officially notified the Graduate School Office of their intended registration. It is the student's responsibility to request a copy of the directives from the appropriate director of graduate studies if he does not receive a copy before the announced registration day.

Registration for the examination takes place in the Graduate School Office through July 1.

- 15 Wednesday—First term of Summer Session ends.
- 17 Friday—Registration of students for second term of Summer Session.
- 20 Monday—Instruction begins for second term of Summer Session.

August

- 3 Monday—Final date for completing application for admission for the fall semester.
- 3 Monday—Final date for filing with the Graduate School Office the Statement of Intention to complete requirements for the master's degree during the Summer Session. If a thesis is to be presented, the title is to be filed at the same time as the Statement of Intention.
- 14 Friday—Last day for submitting theses for master's degrees.
- 22 Saturday—Second term of Summer Session ends.
- 22 Saturday—Final date for completion of requirements for Graduate School degree to be awarded September 1.

Academic Year 1970-71

September

- 16 Wednesday—English examination for foreign students: 2:00 p.m., 111 Biological Sciences Building. Consultation with directors of graduate studies concerning course program.
- 18 Friday—Registration for new and non-preregistered returning students. Indoor Stadium.
- 19 Saturday—Final date for changing registration with reduction in fees. (See October 23 for changes resulting from passing a preliminary examination.)
- 20 Sunday—University Convocation.
- 21 Monday—Classes begin.

October

- 2 Friday—Final date for changes in registration which involve adding courses, provided that no reduction in fees is entailed.
- 16 Friday—Final date for dropping course-seminar registration and adding equivalent units of research.
- 23 Friday—Final date for change in registration resulting from passing a preliminary examination.

November

- 11 Wednesday—Examinations for students electing English for a foreign language requirement; room and hours to be announced. Registration in the Graduate School Office through November 4.
- 16-17 Monday, Tuesday—Spring preregistration.
- 25 Wednesday, 12:30 p.m.—Thanksgiving recess begins.
- 30 Monday, 8:10 a.m.—Classes are resumed.

December

- 11 Friday—Founders' Day.
- 19 Saturday, 12:30 p.m.—Christmas recess begins.

January

- 4 Monday, 8:10 a.m.—Classes are resumed.
- 14-20 Reading Period.
- 21 Thursday—Final examinations begin.
- 30 Saturday—Final examinations end.

February

- 3 Wednesday—English examination for foreign students: 2:00 p.m., 309 Flowers Building. (See p. 43 for information.)
- 6 Saturday—Registration for students not in residence during fall semester and for current students who failed to preregister. Final date for changing registration with reduction in fees. (See March 15 for changes resulting from passing a preliminary examination.)
- 8 Monday—Classes are resumed.
- 15 Monday—Last day for applying for admission and award for the fall semester.
- 22 Monday—Final date for changes in registration which involve adding courses, provided that no reduction in fees is entailed.

March

- 1 Monday—Final date for filing with the Graduate School Office the Statement of Intention of receiving advanced degree in June. Titles of theses and dissertations are to be filed concurrently with the Statement of Intention.
- 8 Monday—Final date for dropping course-seminar registration and adding equivalent units of research.
- 15 Monday—Final date for change in registration resulting from passing a preliminary examination.
- 27 Saturday, 12:30 p.m.—Spring recess begins.

April

- 5 Monday, 8:10 a.m.—Classes are resumed.
- 12–13 Monday, Tuesday—Fall and summer preregistration.
- 15 Thursday—Last day for submitting dissertations for degrees of Doctor of Philosophy and Doctor of Education.
- 30 Friday—Examinations for students electing English for a foreign language requirement; room and hours to be announced. Registration for examination takes place in the Graduate School Office through April 23.

May

- 3 Monday—Last day for submitting theses for degrees of Master of Arts, Master of Science, Master of Education, and Master of Arts in Teaching.
- 12 Wednesday—Final date for completing application for admission in the Summer Session, first term.
- 18–23 Reading Period.
- 24 Monday—Final examinations begin.

June

- 2 Wednesday—Final examinations end.
- 5 Saturday—Commencement begins.
- 6 Sunday—Commencement sermon.
- 7 Monday—Graduation exercises.

Officers of the University Administration

Terry Sanford, LL.B., *President*

Barnes Woodhall, M.D., *Chancellor pro tem*

Marcus E. Hobbs, Ph.D., *Provost*

Charles B. Huestis, *Vice President for Business and Finance*

William G. Anlyan, M.D., *Vice President for Health Affairs*

Frank Leon Ashmore, A.B., *Vice President for Institutional Advancement*

Gerhard Chester Henriksen, M.A., C.P.A., *Vice President and Treasurer*

Everett Harold Hopkins, M.A., LL.D., *Vice President for Regional Programs*

Harold W. Lewis, Ph.D., *Vice Provost and Dean of Faculty*

John C. McKinney, Ph.D., *Vice Provost and Dean of the Graduate School*

James L. Price, Jr., Ph.D., *Vice Provost and Dean of Undergraduate Education*

Craufurd David Goodwin, Ph.D., *Vice Provost and Director of International Programs*

Benjamin Edward Powell, Ph.D., *Librarian*

Clark R. Cahow, Ph.D., *University Registrar*

Rufus H. Powell, LL.B., *Secretary of University*

Stephen Cannada Harward, A.B., C.P.A., *Assistant Secretary and Controller*

Edwin Constant Bryson, LL.B., *University Counsel*

Graduate School Administration

John C. McKinney, Ph.D., *Dean of the Graduate School*

David V. Martin, Ed.D., *Associate Dean*

Dale B. J. Randall, Ph.D., *Assistant Dean*

Executive Committee of the Graduate Faculty

John R. Gregg*

Charles M. Harman

Alan Kerckhoff*

John C. McKinney

Holger Nygard*

George M. Padilla

Louis D. Quin*

John TePaske

Franklin W. Young

*Term expires September 1970.

Instructional Staff

Members of the Graduate School Faculty

(As of October 1, 1969.)

The date denotes the first year of service at Duke University.

Frances Dorothy Acomb (1945) Ph.D., Associate Professor of History
Paul W. Abeles (1965) D.Sc., Visiting Professor of Civil Engineering
John Richard Alden (1955) Ph.D., James B. Duke Professor of History
Irving Alexander (1963) Ph.D., Professor of Psychology
A. Tilo Alt (1965) Ph.D., Assistant Professor of German
John C. Altrocchi (1957) Ph.D., Professor of Psychology
D. Bernhard Amos (1962) M.D., James B. Duke Professor of Immunology
Carl Anderson (1955) Ph.D., Associate Professor of English
Lewis Edward Anderson (1936) Ph.D., Professor of Botany
Nels C. Anderson (1966) Ph.D., Assistant Professor of Physiology
Roger Fabian Anderson (1950) Ph.D., Professor of Forest Entomology
Thomas E. Andreoli (1965) M.D., Assistant Professor of Physiology
Mahadeo L. Apte (1965) Ph.D., Associate Professor of Anthropology
*Clay M. Armstrong (1966) M.D., Assistant Professor of Physiology
John Leslie Artley (1955) D.Eng., Professor of Electrical Engineering
Kurt W. Back (1959) Ph.D., Professor of Sociology
Joseph Randle Bailey (1946) Ph.D., Professor of Zoology

*Resigned, June 30, 1969.

Frank Baker (1960) Ph.D., *Professor of Religion*
 Helmy Hamdollah Baligh (1967) Ph.D., *Associate Professor of Business Administration*
 M. Margaret Ball (1963) Ph.D., *Professor of Political Science*
 Robert H. Ballantyne (1962) Ed.D., *Associate Professor of Education*
 Robert Lloyd Barnes (1965) Ph.D., *Professor of Forest Biochemistry*
 Charles A. Baylis (1952) Ph.D., *Professor of Philosophy*
 William Waldo Beach (1946) B.D., Ph.D., *Professor of Christian Ethics*
 Joseph Willis Beard (1937) M.D., *Professor of Virology*
 Roland Frederick Becker (1951) Ph.D., *Associate Professor of Anatomy*
 William P. Beres (1966) Ph.D., *Assistant Professor of Physics*
 Frederick Bernheim (1930) Ph.D., *James B. Duke Professor of Pharmacology*
 Mary L. C. Bernheim (1930) Ph.D., *Professor of Biochemistry*
 L. C. Biedenharn, Jr. (1961) Ph.D., *Professor of Physics*
 William Dwight Billings (1952) Ph.D., *James B. Duke Professor of Botany*
 *Edward Georges Bilpuch (1962) Ph.D., *Associate Professor of Physics*
 Martin Lee Black, Jr. (1930) M.B.A., C.P.A., *Professor of Accounting*
 John O. Blackburn (1959) Ph.D., *Professor of Economics*
 J. J. Blum (1962) Ph.D., *Professor of Physiology*
 †William L. Boletta (1967) Ph.D., *Assistant Professor of German*
 Cazlyn Green Bookhout (1935) Ph.D., *Professor of Zoology*
 Howard Boozer (1969) Ph.D., *Adjunct Professor of Education*
 Lloyd J. Borstelmann (1953) Ph.D., *Associate Professor of Psychology*
 ‡Jack Botwinick (1963) Ph.D., *Lecturer in Psychology*
 Nancy Bowers (1965) Ph.D., *Assistant Professor of Anthropology*
 Francis Ezra Bowman (1945) Ph.D., *Professor of English*
 §Benjamin Boyce (1950) Ph.D., *James B. Duke Professor of English*
 William Boyle (1963) Ph.D., *Assistant Professor of Immunology*
 John S. Boynton (1968) Ph.D., *Assistant Professor of Botany*
 ||Melvin O. Braaten (1965) Ph.D., *Assistant Professor of Forest Biometry*
 Charles Kilgo Bradsher (1939) Ph.D., *James B. Duke Professor of Chemistry*
 Ralph Braibanti (1953) Ph.D., *James B. Duke Professor of Political Science*
 Karl Braithwaite (1969) Ph.D., *Assistant Professor of Political Science*
 Ralph Brauer (1966) Ph.D., *Professor of Physiology and Pharmacology*
 Jack Brehm (1958) Ph.D., *Professor of Psychology*
 Rubin Bressler (1961) M.D., *Professor of Physiology*

*On leave, 1969-70.

†Resigned, August 31, 1969.

‡Resigned, February 1, 1969.

§Retired, August 31, 1969.

||Resigned, August 31, 1969.

Earl Ivan Brown, II (1960) Ph.D., *J. A. Jones Professor of Civil Engineering*

Frances Campbell Brown (1931) Ph.D., *Professor of Chemistry*

Myrtle Irene Brown (1967) Ph.D., *Associate Professor of Nursing*

Edward H. Bryan (1960) Ph.D., *Professor of Civil Engineering*

Marion R. Bryson (1962) Ph.D., *Associate Professor of Mathematics*

C. Edward Buckley, III (1960) M.D., *Assistant Professor of Microbiology and Immunology*

Louis J. Budd (1952) Ph.D., *Professor of English*

John Buettner-Janusch (1965) Ph.D., *Professor of Anatomy and Professor of Zoology*

Donald S. Burdick (1962) Ph.D., *Associate Professor of Mathematics*

Robert Mercer Burger (1962) Ph.D., *Adjunct Associate Professor of Electrical Engineering*

Peter M. Burkholder (1965) M.D., *Assistant Professor of Pathology*

*Jacob Burlak (1965) Ph.D., *Associate Professor of Mathematics*

R. O. Burns (1964) Ph.D., *Associate Professor of Microbiology*

Gale H. Buzzard (1964) Ph.D., *Assistant Professor of Mechanical Engineering*

Peter F. Carbone (1966) Ed.D., *Assistant Professor of Education*

Leonard Carlitz (1932) Ph.D., *James B. Duke Professor of Mathematics*

Dwight W. Carpenter (1966) Ph.D., *Assistant Professor of Physics*

Robert C. Carson (1960) Ph.D., *Professor of Psychology*

William H. Cartwright (1951) Ph.D., *Professor of Education*

Jack B. Chaddock (1966) Sc.D., *Professor of Mechanical Engineering*

Clifton C. Cherpach (1958-67; 1968) Ph.D., *Professor of Romance Languages*

Donald B. Chesnut (1965) Ph.D., *Associate Professor of Chemistry*

Henry B. Clark (1966) Ph.D., *Associate Professor of Religion*

Peter Barton Clark (1967) Ph.D., *Assistant Professor of Economics*

Romane Lewis Clark (1953) Ph.D., *Professor of Philosophy*

Gerald Wayne Clough (1969) Ph.D., *Assistant Professor of Civil Engineering*

John D. Coie (1968) Ph.D., *Assistant Professor of Psychology*

Robert Taylor Cole (1935) Ph.D., *James B. Duke Research Professor of Political Science*

†Joel Colton (1947) Ph.D., *Professor of History*

Robert Merle Colver (1953) Ed.D., *Associate Professor of Education*

Norman Francis Conant (1935) Ph.D., *James B. Duke Professor of Microbiology*

‡Apostolos Condos (1966) Ph.D., *Assistant Professor of Economics*

Robert L. Cook (1963) Ph.D., *Assistant Professor of Physics*

*Absent on leave, 1969-70.

†Absent on sabbatical leave, academic year 1970-71.

‡Resigned, August 31, 1969.

*Samuel D. Cook (1966) Ph.D., *Associate Professor of Political Science*
Thomas Howard Cordle (1950) Ph.D., *Associate Professor of Romance Languages*

John Costlow (1959) Ph.D., *Professor of Zoology*

Sheila J. Counce (1965) Ph.D., *Assistant Professor of Anatomy*

J. Christopher Crocker (1966) Ph.D., *Assistant Professor of Anthropology*

Kathryn McAllister Crossland (1967) Ed.D., *Professor of Nursing*

Elaine Crovitz (1965) Ph.D., *Lecturer in Psychology*

Herbert F. Crovitz (1963) Ph.D., *Lecturer in Psychology*

†William L. Culberson (1955) Ph.D., *Associate Professor of Botany*

‡John Shelton Curtiss (1945) Ph.D., *James B. Duke Professor of History*

Robert Earle Cushman (1945) B.D., Ph.D., *Professor of Systematic Theology*

§Bingham Dai (1943) Ph.D., *Professor of Psychology*

Thaddeus Dankel (1968) Ph.D., *Assistant Professor of Mathematics*

David G. Davies (1961) Ph.D., *Professor of Economics*

William D. Davies (1966) D.D., *Professor of Religion*

Calvin D. Davis (1962) Ph.D., *Associate Professor of History*

Gifford Davis (1930) Ph.D., *Professor of Romance Languages*

J. A. Davis (1967) Ph.D., *Adjunct Professor of Education*

Lucy Davis (1969) Ed.D., *Adjunct Associate Professor of Education*

Morris Davis (1966) Ph.D., *Adjunct Professor of Mathematics*

Eugene Davis Day (1962) Ph.D., *Professor of Immunology*

David C. Dellinger (1968) Ph.D., *Associate Professor of Business Administration*

Frank Traver de Vyver (1935) Ph.D., *Professor of Economics*

Irving Diamond (1958) Ph.D., *Professor of Psychology*

Joseph Di Bona (1967) Ph.D., *Associate Professor of Education*

Neal Dow (1934) Ph.D., *Professor of Romance Languages*

Roger W. Doyle (1967) Ph.D., *Assistant Professor of Zoology*

Francis George Dressel (1929) Ph.D., *Professor of Mathematics*

||Bernard Duffey (1960) Ph.D., *Professor of English*

Kenneth Lindsay Duke (1940) Ph.D., *Associate Professor of Anatomy*

*Robert F. Durden (1952) Ph.D., *Professor of History*

Jiri Dvorak (1967) C.Sc., Ph.D., *Assistant Professor of Civil Engineering*

Paul Earls (1959) Ph.D., *Associate Professor of Music*

††Carl Eisdorfer (1956) Ph.D., *Lecturer in Psychology*

Jane G. Elchlepp (1956) Ph.D., *Associate Professor of Pathology*

°Absent on leave, 1969-70.

†Absent on sabbatical leave, fall semester, 1969.

‡Retired, August 31, 1969.

§Retired, August 31, 1969.

||Absent on sabbatical leave, spring semester, 1970.

*°Absent on leave, 1970-71.

††Absent on sabbatical leave, 1969-70.

Ernest Elsevier (1950) M.S. in M.E., *Associate Professor of Mechanical Engineering*

Max D. Englehart (1966) Ph.D., *Lecturer in Education*

Carl Erickson (1966) Ph.D., *Assistant Professor of Psychology*

Marilyn Erickson (1968) Ph.D., *Visiting Associate Professor of Education*

R. P. Erickson (1961) Ph.D., *Associate Professor of Psychology*

*Lawrence Evans (1963) Ph.D., *Associate Professor of Physics*

John Wendell Everett (1932) Ph.D., *Professor of Anatomy*

Henry A. Fairbank (1961) Ph.D., *Professor of Physics*

Ben W. Feather (1963) M.D., Ph.D., *Lecturer in Psychology*

John Morton Fein (1950) Ph.D., *Professor of Romance Languages*

Robert E. Fellows, Jr. (1962) M.D., *Assistant Professor of Physiology*

Arthur Bowles Ferguson (1939) Ph.D., *Professor of History*

Oliver Ferguson (1957) Ph.D., *Professor of English*

Bernard F. Fetter (1951) M.D., *Professor of Pathology*

†J. Michael Finger (1965) Ph.D., *Assistant Professor of Economics*

Peter G. Fish (1969) Ph.D., *Assistant Professor of Political Science*

Donald J. Fluke (1957) Ph.D., *Professor of Zoology*

Lloyd R. Fortney (1964) Ph.D., *Assistant Professor of Physics*

Earle Fowler (1962) Ph.D., *Professor of Physics*

John A. Fowler (1953) M.D., *Assistant Professor of Psychiatry*

Wallace Fowlie (1964) Ph.D., *James B. Duke Professor of Romance Languages*

Richard G. Fox (1968) Ph.D., *Assistant Professor of Anthropology*

Charles H. Frenzel (1955) A.B., *Professor of Hospital Administration*

Irwin Fridovich (1958) Ph.D., *Associate Professor of Biochemistry*

Mercedes Gaffron (1958) M.D., Ph.D., *Associate Research Professor of Psychology*

Thomas M. Gallie, Jr. (1954-55; 1956) Ph.D., *Professor of Mathematics*

Ila Gehman (1959) Ed.D., *Lecturer in Psychology*

W. Scott Gehman, Jr. (1954) Ph.D., *Professor of Psychology in Education*

Rhett Truesdale George, Jr. (1957) Ph.D., *Assistant Professor of Electrical Engineering*

Donald E. Ginter (1963) Ph.D., *Associate Professor of History*

Sherwood Githens (1962) Ph.D., *Professor of Science Education*

Clarence Gohdes (1930) Ph.D., *James B. Duke Professor of English*

Craufurd Goodwin (1962) Ph.D., *Professor of Economics*

Walter Gordy (1946) Ph.D., LL.D., D.H.C., *James B. Duke Professor of Physics*

Nicholas W. Gillham (1968) Ph.D., *Associate Professor of Zoology*

Richard Babson Grant (1952) Ph.D., *Professor of Romance Languages*

*Absent on sabbatical leave, spring semester, 1970.

†Resigned, August 31, 1969.

- Charles W. Greenbaum (1968) Ph.D., *Visiting Associate Professor of Psychology*
- Ronald C. Greene (1958) Ph.D., *Assistant Professor of Biochemistry*
- John R. Gregg (1957) Ph.D., *Professor of Zoology*
- Eugene Grueling (1948) Ph.D., *Professor of Physics*
- *Egil Grislis (1961) Ph.D., *Associate Professor of Religion*
- Samson Gross (1960) Ph.D., *Professor of Genetics and Biochemistry*
- Kazimiere Grzybowski (1967) S.J.D., *Adjunct Professor of Political Science*
- Walter R. Guild (1960) Ph.D., *Professor of Biophysics*
- Norman Guttman (1951) Ph.D., *Associate Professor of Psychology*
- *Robert A. Guyer (1964) Ph.D., *Assistant Professor of Physics*
- Donald B. Hackel (1960) M.D., *Professor of Pathology*
- Herbert Hacker, Jr. (1965) Ph.D., *Associate Professor of Electrical Engineering*
- Dwight H. Hall (1968) Ph.D., *Assistant Professor of Biochemistry*
- †Hugh Marshall Hall, Jr. (1953) Ph.D., *Professor of Political Science*
- Louise Hall (1931) S.B.Arch., Ph.D., *Professor of Architecture*
- ‡John Hamilton Hallowell (1942) Ph.D., *Professor of Political Science*
- Iain Hamilton (1962) B.Mus., *Mary Duke Biddle Professor of Music*
- §William Baskerville Hamilton (1936) Ph.D., *Professor of History*
- William E. Hammond (1963) Ph.D., *Assistant Professor of Biomedical Engineering*
- Moo-Young Han (1967) Ph.D., *Assistant Professor of Physics*
- ||Philip Handler (1939) Ph.D., *James B. Duke Professor of Biochemistry and Nutrition*
- **Frank Allan Hanna (1948) Ph.D., *Professor of Economics*
- Charles Morgan Harman (1961) Ph.D., *Associate Professor of Mechanical Engineering*
- Ellwood Scott Harrar (1936) Ph.D., *James B. Duke Professor of Wood Science*
- Philip D. Harriman (1968) Ph.D., *Assistant Professor of Biochemistry*
- Jerome S. Harris (1936) M.D., *Associate Professor of Biochemistry*
- ††Charles Roy Hauser (1929) Ph.D., *James B. Duke Professor of Chemistry*
- Thomas M. Havrilesky (1969) Ph.D., *Associate Professor of Economics*
- William S. Heckscher (1966) Ph.D., *Benjamin N. Duke Professor of Art*
- Henry Hellmers (1965) Ph.D., *Professor of Botany*
- Carl O. Helvie (1969) M.S., *Associate Professor of Nursing*
- Robert William Henkins (1968) Ph.D., *Assistant Professor of Chemistry*
- *Resigned, August 31, 1969.
- †Absent on sabbatical leave, spring semester, 1970.
- ‡Absent on sabbatical leave, spring semester, 1970.
- §Absent on sabbatical leave, spring semester, 1970.
- ||Absent on leave, 1969-70.
- **Absent on leave, fall semester, 1969.
- ††Deceased, January 6, 1970.

Stuart C. Henry (1959) Ph.D., *Professor of American Christianity*
 Charles Henson (1967) Ph.D., *Assistant Professor of Mathematics*
 Duncan Heron (1950) Ph.D., *Associate Professor of Geology*
 David Guy Herr (1967) Ph.D., *Assistant Professor of Mathematics*
 Barton Robert Herracher (1969) Ed.D., *Adjunct Assistant Professor of Education*
 Stephen Hersey (1969) Ph.D., *Assistant Professor of Physiology and Pharmacology*
 Frederick Herzog (1960) B.D., Th.M., Th.D., *Professor of Systematic Theology*
 David William Hill (1962) Ph.D., *Associate Professor of Civil Engineering*
 R. L. Hill (1962) Ph.D., *Professor of Biochemistry*
 Hans J. Hillerbrand (1959) Ph.D., *Professor of Modern European Christianity and Professor of History*
 Frederick R. Hine (1958) M.D., *Associate Professor of Psychology*
 I. I. Hirschman (1968) Ph.D., *Visiting Professor of Mathematics*
 Marcus Edwin Hobbs (1935) Ph.D., *Professor of Chemistry*
 *Paul E. Hochstein (1963) Ph.D., *Associate Professor of Physiology and Pharmacology*
 Richard Earl Hodel (1965) Ph.D., *Assistant Professor of Mathematics*
 Irving B. Holley, Jr. (1947) Ph.D., *Professor of History*
 †Frederic B. M. Hollyday (1959) Ph.D., *Associate Professor of History*
 ‡Everett H. Hopkins (1961) M.A., LL.D., *Professor of Education*
 §Edward Charles Horn (1946) Ph.D., *Professor of Zoology*
 ||Paul Horowicz (1961) Ph.D., *Professor of Physiology*
 Max Huber (1966) Ph.D., *Visiting Assistant Professor of Mathematics*
 Alexander Hull (1962) Ph.D., *Associate Professor of Romance Languages*
 **Wanda Sanborn Hunter (1947) Ph.D., *Associate Professor of Zoology*
 Allan S. Hurlburt (1956) Ph.D., *Professor of Education*
 Mary Huse (1962) Ph.D., *Lecturer in Psychology*
 Miriam Jacobs (1968) Ph.D., *Assistant Professor of Anatomy*
 Wallace Jackson (1965) Ph.D., *Assistant Professor of English*
 Peter W. Jeffs (1964) Ph.D., *Associate Professor of Chemistry*
 Bronislas de Leval Jezierski (1958) Ph.D., *Associate Professor of Slavic Languages and Literatures*
 Frans F. Jöbssis (1964) Ph.D., *Associate Professor of Physiology*
 Charles B. Johnson (1956) Ed.D., *Associate Professor of Education*
 Edward Johnson (1963) M.D., *Professor of Physiology and Pharmacology*

*Resigned, August 31, 1969.

†Absent on sabbatical leave, spring semester, 1970.

‡Absent on leave, fall semester, 1969.

§Deceased, November 18, 1969.

||Resigned, June 30, 1969.

**Retired, January 31, 1969.

- Joseph C. Johnson (1967) Ed.D., *Associate Professor of Education*
 Terry W. Johnson, Jr. (1954) Ph.D., *Professor of Botany*
 William Thomas Joines (1966) Ph.D., *Associate Professor of Electrical Engineering*
 Wolfgang Karl Joklik (1968) D.Phil., *Professor of Microbiology*
 Buford Jones (1962) Ph.D., *Associate Professor of English*
 Edward Ellsworth Jones (1953) Ph.D., *Professor of Psychology*
 Leon Lloyd Jones (1963) Ph.D., *Assistant Professor of Chemistry*
 Oliver William Jones (1963) M.D., *Associate Professor of Biochemistry*
 Jayant G. Joshi (1967) Ph.D., *Associate in Biochemistry*
 Henry Kamin (1948) Ph.D., *Professor of Biochemistry*
 Julian N. Kanfer (1968) Ph.D., *Associate Professor of Biochemistry*
 William G. Katzenmeyer (1967) Ed.D., *Associate Professor of Education*
 Bernard Kaufman (1968) Ph.D., *Associate Professor of Biochemistry*
 Thomas F. Keller (1959) Ph.D., *Professor of Business Administration*
 Van Leslie Kenyon, Jr. (1945) M.M.E., *Professor of Mechanical Engineering*
 Alan C. Kerckhoff (1958) Ph.D., *Professor of Sociology*
 Robert B. Kerr (1965) Ph.D., *Professor of Electrical Engineering*
 Thomas DeArman Kinney (1960) M.D., *Professor of Pathology*
 Marcel Kinsbourne (1967) M.D., *Lecturer in Psychology*
 Warren Kirkendale (1967) Dr.Phil., *Associate Professor of Musicology*
 Norman Kirshner (1956) Ph.D., *Associate Professor of Biochemistry*
 Joseph Weston Kitchen, Jr. (1962) Ph.D., *Associate Professor of Mathematics*
 Gordon K. Klintworth (1964) Ph.D., M.D., *Associate Professor of Pathology*
 Peter H. Klopfer (1958) Ph.D., *Professor of Zoology*
 K. R. Knoerr (1961) Ph.D., *Associate Professor of Forest Meteorology in Forestry and Associate Professor of Biometeorology in Botany*
 Allan Kornberg (1965) Ph.D., *Professor of Political Science*
 *Paul Jackson Kramer (1931) Ph.D., *James B. Duke Professor of Botany*
 Nicholas Michael Kredich (1968) M.D., *Assistant Professor of Biochemistry*
 †Irwin Kremen (1963) Ph.D., *Assistant Professor of Psychology*
 Juanita M. Kreps (1955) Ph.D., *Professor of Economics*
 William R. Krigbaum (1952) Ph.D., *James B. Duke Professor of Chemistry*
 Arnold D. Krugman (1964) Ph.D., *Lecturer in Psychology*
 Magnus Jan Krynski (1966) Ph.D., *Associate Professor of Slavic Languages and Literatures*

*Absent on sabbatical leave, spring semester, 1970.

†Absent on sabbatical leave, 1969-70.

Wladyslaw W. Kulski (1963) Dr.Jur., *James B. Duke Professor of Russian Affairs*

Sudhir Kumar (1959) Ph.D., *Associate Professor of Civil Engineering*

Weston La Barre (1946) Ph.D., *Professor of Anthropology*

Leon Lack (1965) Ph.D., *Associate Professor of Physiology and Pharmacology*

Creighton Lacy (1953) B.D., Ph.D., *Professor of Missions and Social Ethics*

Martin Lakin (1958) Ph.D., *Professor of Psychology and Professor of Medical Psychology*

Thomas Langford (1956) Ph.D., *Professor of Religion*

John Tate Lanning (1927) Ph.D., *James B. Duke Professor of History*

John E. Larsh, Jr. (1943) Sc.D., *Professor of Parasitology in Microbiology and Immunology*

*Danny J. Laughhunn (1968) D.B.A., *Assistant Professor of Business Administration*

Richard H. Leach (1955) Ph.D., *Professor of Political Science*

Warren Lerner (1961) Ph.D., *Associate Professor of History*

Harold Walter Lewis (1949) Ph.D., *Professor of Physics*

Melvyn Lieberman (1967) Ph.D., *Assistant Professor of Physiology and Pharmacology*

John L. Lievsay (1962) Ph.D., *Professor of English*

Darwyn E. Linder (1965) Ph.D., *Associate Professor of Psychology*

L. Sigfred Linderth, Jr. (1965) M.E., *Professor of Mechanical Engineering*

Daniel A. Livingstone (1956) Ph.D., *Professor of Zoology*

Charles H. Lochmüller (1969) Ph.D., *Assistant Professor of Chemistry*

Gregory Lockhead (1965) Ph.D., *Associate Professor of Psychology*

E. Croft Long (1956) M.D., *Associate Professor of Physiology and Pharmacology*

Ronald Luftig (1969) Ph.D., *Assistant Professor of Microbiology*

William S. Lynn, Jr. (1954) M.D., *Associate Professor of Biochemistry*

George W. Lynts (1965) Ph.D., *Assistant Professor of Geology*

K. S. McCarty (1950) Ph.D., *Professor of Biochemistry*

†William C. McCormack (1964) Ph.D., *Associate Professor of Sociology*

John C. McKinney (1957) Ph.D., *Professor of Sociology*

Thomas J. McManus (1961) M.D., *Associate Professor of Physiology*

John Nelson Macduff (1956) M.M.E., *Professor of Mechanical Engineering*

George L. Maddox (1960) Ph.D., *Professor of Sociology*

Moses S. Mahaley (1965) Ph.D., *Assistant Professor of Anatomy*

Edward P. Mahoney (1965) Ph.D., *Assistant Professor of Philosophy*

*Resigned, August 31, 1969.

†Resigned, August 31, 1969.

- Joseph Eldridge Markee (1943) Ph.D., *James B. Duke Professor of Anatomy*
- Sidney David Markman (1947) Ph.D., *Professor of Art History and Archaeology*
- David V. Martin (1962) Ed.D., *Associate Professor of Education*
- Seymour Mauskopf (1964) Ph.D., *Assistant Professor of History*
- Elias Meezan (1969) Ph.D., *Assistant Professor of Pharmacology*
- Otto Meier, Jr. (1934) Ph.D., *Professor of Electrical Engineering*
- Elgin W. Mellow, Jr. (1965) Ph.D., *Associate Professor of English*
- †James Lathrop Meriam (1963) Ph.D., *Professor of Engineering Mechanics*
- Richard S. Metzgar (1962) Ph.D., *Associate Professor of Immunology*
- Johannes Horst Max Meyer (1959) D.Sc., *Professor of Physics*
- Paul Meyvaert (1967) *Lecturer in Art*
- Robert C. Moeller (1969) Ph.D., *Assistant Professor of Art*
- John W. Moore (1961) Ph.D., *Professor of Physiology*
- Lawrence C. Moore, Jr. (1966) Ph.D., *Assistant Professor of Mathematics*
- Montrose J. Moses (1959) Ph.D., *Professor of Anatomy*
- Bruce J. Muga (1967) Ph.D., *Associate Professor of Civil Engineering*
- Arvin W. Murch (1969) Ph.D., *Assistant Professor of Sociology*
- Roland E. Murphy (1967) S.T.D., *Professor of Religion*
- Francis Joseph Murray (1960) Ph.D., *Professor of Mathematics*
- James J. Murray (1967) M.S., *Adjunct Associate Professor of Mechanical Engineering*
- George C. Meyers (1968) Ph.D., *Professor of Sociology*
- Toshio Narahashi (1965) Ph.D., *Associate Professor of Physiology*
- Aubrey Willard Naylor (1952) Ph.D., *Professor of Botany*
- *Thomas H. Naylor (1964) Ph.D., *Professor of Economics*
- Glenn Robert Negley (1946) Ph.D., *Professor of Philosophy*
- Henry Winston Newson (1948) Ph.D., *James B. Duke Professor of Physics*
- Francis Newton (1967) Ph.D., *Professor of Latin in Classical Studies*
- Robert Bruce Nicklas (1965) Ph.D., *Associate Professor of Zoology*
- Harry Stewart Nielsen (1965) Ph.D., *Assistant Professor of Microbiology*
- †Loren Nolte (1966) Ph.D., *Associate Professor of Electrical Engineering*
- Holger O. Nygard (1960) Ph.D., *Professor of English*
- John F. Oates (1967) Ph.D., *Associate Professor of Ancient History in Classical Studies*
- Walter D. Obrist (1956) Ph.D., *Lecturer in Psychology*
- William M. O'Fallon (1965) Ph.D., *Assistant Professor of Mathematics*
- Bernard V. O'Neill (1968) Ph.D., *Assistant Professor of Mathematics*
- Robert T. Osborn (1954) B.D., Ph.D., *Associate Professor of Religion*
- *Absent on leave, 1969-70.
 †Absent on leave, 1969-70.
 ‡Absent on sabbatical leave, 1969-70.

Suydam Osterhout (1959) Ph.D., *Associate Professor of Microbiology*
 Athos Ottolenghi (1959) M.D., *Associate Professor of Physiology and Pharmacology*
 Harry Ashton Owen, Jr. (1951) Ph.D., *Professor of Electrical Engineering*
 George M. Padilla (1965) Ph.D., *Associate Professor of Physiology*
 Aubrey E. Palmer (1944) C.E., *Associate Professor of Civil Engineering*
 Keith H. Palmer (1969) Ph.D., *Clinical Assistant Professor of Pharmacology*
 Richard A. Palmer (1966) Ph.D., *Assistant Professor of Chemistry*
 Erdman B. Palmore (1967) Ph.D., *Associate Professor of Sociology*
 Harold Talbot Parker (1939) Ph.D., *Professor of History*
 Harry Partin (1964) Ph.D., *Assistant Professor of Religion*
 Joel Francis Paschal (1954) Ph.D., *Professor of Law*
 Merrill Lee Patrick (1964) Ph.D., *Associate Professor of Mathematics*
 Ransom Rathbone Patrick (1954) M.F.A., Ph.D., *Professor of Aesthetics and Art*
 Lewis Patton (1926) Ph.D., *Professor of English*
 William Bernard Peach (1951) Ph.D., *Professor of Philosophy*
 George Wilbur Pearsall (1964) Sc.D., *Professor of Mechanical Engineering*
 Talmage Lee Peele (1939) M.D., *Professor of Anatomy*
 Harold Sanford Perry (1932) Ph.D., *Professor of Botany*
 Anton Peterlin (1962) Ph.D., *Adjunct Professor of Chemistry*
 Ray C. Petry (1937) Ph.D., LL.D., *James B. Duke Professor of Church History*
 Olan Lee Petty (1952) Ph.D., *Professor of Education*
 Leland R. Phelps (1961) Ph.D., *Professor of German*
 Jane Philpott (1951) Ph.D., *Professor of Botany*
 Orrin Pilkey (1965) Ph.D., *Associate Professor of Geology*
 Theo Clyde Pilkington (1958) Ph.D., *Professor of Electrical Engineering and Professor of Biomedical Engineering*
 Robert A. Pittillo, Jr. (1968) Ed.D., *Associate Professor of Education*
 Jacques C. Poirier (1955) Ph.D., *Professor of Chemistry*
 Louis Pondy (1967) Ph.D., *Associate Professor of Business Administration and Assistant Professor of Sociology*
 Ned Allen Porter (1969) Ph.D., *Assistant Professor of Chemistry*
 Herbert S. Posner (1968) Ph.D., *Clinical Associate Professor of Pharmacology*
 W. H. Poteat (1960) B.D., Ph.D., *Professor of Christianity and Culture*
 Benjamin Edward Powell (1946) Ph.D., *Librarian*
 Richard Lionel Predmore (1950) D.M.L., *Professor of Romance Languages*
 Jack J. Preiss (1959) Ph.D., *Professor of Sociology*
 Richard A. Preston (1961) Ph.D., *William K. Boyd Professor of History*
 James Ligon Price, Jr. (1952) Ph.D., *Professor of Religion*

- Jesse Harris Proctor, Jr. (1958) Ph.D., *Professor of Political Science*
 *Jack H. Prost (1966) Ph.D., *Assistant Professor of Anatomy and Assistant Professor of Sociology*
 Louis DuBose Quin (1956) Ph.D., *Professor of Chemistry*
 K. V. Rajagopalan (1966) Ph.D., *Assistant Professor of Biochemistry*
 Charles William Ralston (1953) Ph.D., *Professor of Forest Soils*
 Dale B. J. Randall (1957) Ph.D., *Associate Professor of English*
 †Robert Stanley Rankin (1927) Ph.D., *Professor of Political Science*
 John Reckless (1968) M.B.Ch.B., *Associate Professor of Psychiatry*
 Michael Kay Reedy (1969) M.D., *Associate Professor of Anatomy*
 Edmund Reiss (1967) Ph.D., *Professor of English*
 Eugene M. Renkin (1963) Ph.D., *Professor of Physiology*
 Thomas D. Reynolds (1953) Ph.D., *Associate Professor of Mathematics*
 Lawrence Richardson, Jr. (1966) Ph.D., *Professor of Latin in Classical Studies*
 Russell Roberson (1963) Ph.D., *Associate Professor of Physics*
 John Henderson Roberts (1931) Ph.D., *Professor of Mathematics*
 J. David Robertson (1966) Ph.D., *Professor of Anatomy*
 Charles K. Robinson (1961) Ph.D., *Associate Professor of Religion*
 Hugh G. Robinson (1964) Ph.D., *Associate Professor of Physics*
 Hermann R. Robl (1959-64; 1966) Ph.D., *Adjunct Professor of Physics*
 Christiane Z. Romero (1969) Ph.D., *Visiting Assistant Professor of German*
 Theodore Ropp (1938) Ph.D., *Professor of History*
 Simon Rottenberg (1965) Ph.D., *Professor of Economics*
 David T. Rowlands (1966) M.D., *Associate Professor of Pathology*
 Donald Francis Roy (1950) Ph.D., *Professor of Sociology*
 Ralph Wayne Rundles (1945) Ph.D., M.D., *Professor of Microbiology*
 Harvey J. Sage (1964) Ph.D., *Assistant Professor of Pathology and Assistant Professor of Biochemistry*
 Herman Salinger (1955) Ph.D., *Professor of German*
 John V. Salzano (1956) Ph.D., *Associate Professor of Physiology*
 Charles Richard Sanders (1937) Ph.D., *Professor of English*
 Lloyd Saville (1946) Ph.D., *Professor of Economics*
 Saul M. Schanberg (1967) Ph.D., M.D., *Assistant Professor of Pharmacology*
 ‡Harold Schiffman (1963) Ph.D., *Associate Professor of Psychology*
 Knut Schmidt-Nielsen (1952) Mag.Sc., Dr. Phil., *James B. Duke Professor of Physiology in the Department of Zoology*
 Ernest Schoffeniels (1969) M.D., *Visiting Professor of Physiology and Pharmacology*
 David W. Schomberg (1968) Ph.D., *Assistant Professor of Physiology*
 *Resigned, August 31, 1969.
 †Retired, August 31, 1969.
 ‡Absent on sabbatical leave, spring semester, 1970.

- Anne Firor Scott (1961) Ph.D., *Associate Professor of History*
 William E. Scott (1958) Ph.D., *Associate Professor of History*
 ††Richard A. Scoville (1961) Ph.D., *Assistant Professor of Mathematics*
 Richard B. Searles (1965) Ph.D., *Associate Professor of Botany*
 Walter E. Sewell (1965) Ph.D., *Adjunct Professor of Mathematics*
 Maxwell Eustace Shauck (1968) Ph.D., *Assistant Professor of Mathematics*
 Mary E. Shaughnessy (1969) M.S., *Associate Professor of Nursing*
 Marion L. Shepard (1967) Ph.D., *Assistant Professor of Mechanical Engineering*
 *Joseph R. Shoenfield (1952) Ph.D., *Professor of Mathematics*
 R. Baird Shuman (1962) Ph.D., *Professor of Education*
 Lewis M. Siegel (1966) Ph.D., *Assistant Professor of Biochemistry*
 *Bernard Silberman (1967) Ph.D., *Professor of History*
 Ida Simpson (1967) Ph.D., *Assistant Professor of Sociology*
 †William H. Simpson (1930) Ph.D., *Professor of Political Science*
 Ronald J. Slinn (1968) Ph.D., *Associate Professor of Forest Economics*
 D. Moody Smith (1965) Ph.D., *Associate Professor of Religion*
 ‡David A. Smith (1962) Ph.D., *Associate Professor of Mathematics*
 §Donald S. Smith, II (1961) M.H.A., *Assistant Professor of Hospital Administration*
 Grover C. Smith (1952) Ph.D., *Professor of English*
 J. H. Smith (1969) O.B.E., *Visiting Lecturer of Political Science*
 Joel Smith (1958) Ph.D., *Professor of Sociology*
 Peter Smith (1959) Ph.D., *Associate Professor of Chemistry*
 ||Robert Sidney Smith (1932) Ph.D., *James B. Duke Professor of Economics*
 George G. Somjen (1963) M.D., *Associate Professor of Physiology and Lecturer in Psychology*
 Joachim R. Sommer (1957) M.D., *Associate Professor of Pathology*
 Robert L. Spaulding (1965) Ph.D., *Associate Professor of Education*
 Joseph John Spengler (1934) Ph.D., *James B. Duke Professor of Economics*
 Thomas Arthur Spragens, Jr. (1967) Ph.D., *Assistant Professor of Political Science*
 *°Olaf Stackelberg (1963) Ph.D., *Associate Professor of Mathematics*
 J. E. R. Staddon (1967) Ph.D., *Associate Professor of Psychology*
 W. J. Stambaugh (1961) Ph.D., *Associate Professor of Forestry*
 *Absent on sabbatical leave, 1969-70.
 †Absent on sabbatical leave, fall semester, 1969.
 ‡Absent on sabbatical leave, fall semester, 1969.
 §Absent on sabbatical leave, 1969-70.
 ||Deceased, March 23, 1969.
 *°Absent on leave, 1969-70.
 ††Absent on sabbatical leave, spring semester, 1970.

- Dennis Keith Stanley (1961) Ph.D., *Assistant Professor of Classical Studies*
- Unnsteinn Stefansson (1965) Ph.D., *Adjunct Professor of Zoology*
- Henry R. Stern (1968) Ph.D., *Assistant Professor of German*
- Lionel Stevenson (1955) B.Litt. (Oxon.), Ph.D., F.R.S.L., *James B. Duke Professor of English*
- William Franklin Stinespring (1936) Ph.D., *Professor of Old Testament and Semitics*
- Donald E. Stone (1963) Ph.D., *Associate Professor of Botany*
- Virginia Stone (1966) Ph.D., *Professor of Nursing*
- Boyd R. Strain (1969) Ph.D., *Associate Professor of Botany*
- Victor H. Strandberg (1966) Ph.D., *Associate Professor of English*
- Norbert Straumann (1967) Ph.D., *University Associate Professor of Physics*
- Howard Austin Strobel (1948) Ph.D., *Professor of Chemistry*
- Henry L. Sublett, Jr. (1962) Ed.D., *Associate Professor of Education*
- Herbert P. Sullivan (1960) Ph.D., *Associate Professor of Religion*
- *Elizabeth Read Sunderland (1939-42; 1943) Ph.D., *Associate Professor of Art*
- Louis E. Swanson (1949) A.B., *Associate Professor of Hospital Administration*
- Charles Tanford (1959) Ph.D., *Professor of Biochemistry*
- Shanti Tangri (1969) Ph.D., *Visiting Professor of Economics*
- Robert S. Tate (1967) Ph.D., *Assistant Professor of Romance Languages*
- John J. TePaske (1967) Ph.D., *Professor of History*
- Marcel Tétel (1960) Ph.D., *Professor of Romance Languages*
- Norman Thomas (1969) Ph.D., *Professor of Political Science*
- Edgar Tristram Thompson (1935) Ph.D., *Professor of Sociology*
- Larry W. Thompson (1961) Ph.D., *Lecturer in Psychology*
- Frederick L. Thurstone (1967) Ph.D., *Associate Professor of Electrical Engineering*
- Edward A. Tiryakian (1965) Ph.D., *Professor of Sociology*
- E. Clifford Toren, Jr. (1961) Ph.D., *Associate Professor of Chemistry*
- D. C. Tosteson (1961) M.D., *Professor of Physiology*
- V. G. Treml (1967) Ph.D., *Associate Professor of Economics*
- Philip H. Trickey (1965) M.S.E.E., *Visiting Professor in Electrical Engineering*
- †James Nardin Truesdale (1930) Ph.D., *Professor of Greek*
- Benjamin Trump (1965) M.D., *Professor of Pathology*
- Gene M. Tucker (1966) Ph.D., *Assistant Professor of Old Testament*
- Vance Tucker (1964) Ph.D., *Associate Professor of Zoology*
- Arlin Turner (1953) Ph.D., *Professor of English*

*Absent on sabbatical leave, fall semester, 1969.

†Absent on sabbatical leave, spring semester, 1970.

- *Richard L. Tuthill (1953) Ed.D., *Professor of Geography*
- Stephen Uhalley, Jr. (1968) Ph.D., *Associate Professor of History*
- §Robert van Kluyve (1962) Ph.D., *Associate Professor of English*
- Jacinto J. Vasquez (1963) M.D., *Professor of Pathology*
- ||F. John Vernberg (1951) Ph.D., *Professor of Zoology*
- *John M. Vernon (1966) Ph.D., *Associate Professor of Economics*
- Aleksandar Sedmak Vesić (1964) D.Sc., *Professor of Civil Engineering*
- Patrick R. Vincent (1954) Ph.D., *Associate Professor of Romance Languages*
- F. Stephen Vogel (1961) M.D., *Professor of Pathology*
- Steven Vogel (1966) Ph.D., *Assistant Professor of Zoology*
- Louis D. Volpp (1967) Ph.D., *Professor of Business Administration*
- Fred M. Vukovich (1967) Ph.D., *Adjunct Associate Professor of Forest Meteorology*
- Howard C. Wachtel (1968) Ph.D., *Assistant Professor of Biomedical Engineering in Electrical Engineering*
- Stephen A. Wainwright (1964) Ph.D., *Associate Professor of Zoology*
- Salih J. Wakil (1959) Ph.D., *Professor of Biochemistry and Nutrition*
- Michael Wallach (1962) Ph.D., *Professor of Psychology*
- Richard L. Walter (1962) Ph.D., *Associate Professor of Physics*
- Calvin L. Ward (1952) Ph.D., *Associate Professor of Zoology*
- Frances Ellen Ward (1969) Ph.D., *Assistant Professor of Microbiology*
- *Bruce W. Wardropper (1962) Ph.D., *William Hanes Wannamaker Professor of Romance Languages*
- †Seth L. Warner (1955) Ph.D., *Professor of Mathematics*
- Barbara H. Wasik (1968) Ph.D., *Lecturer in Education*
- Richard Lyness Watson, Jr. (1939) Ph.D., *Professor of History*
- Morris Weisfeld (1967) Ph.D., *Professor of Mathematics*
- Henry Weitz (1950) Ed.D., *Professor of Education*
- Bruce A. Wells (1964) M.S.E.E., *Associate Professor of Electrical Engineering*
- Richard L. Wells (1962) Ph.D., *Associate Professor of Chemistry*
- Paul Welsh (1948) Ph.D., *Professor of Philosophy*
- Daniel P. Werner (1967) Ph.D., *Assistant Professor of Mechanical Engineering*
- Robert W. Wheat (1956) Ph.D., *Associate Professor of Microbiology and Assistant Professor of Biochemistry*
- *Richard A. White (1963) Ph.D., *Associate Professor of Botany*
- Karl Milton Wilbur (1946) Ph.D., *James B. Duke Professor of Zoology*

*Absent on sabbatical leave, 1969-70.

†Absent on leave, 1970-71.

§Resigned, August 31, 1969.

||Resigned, June 30, 1969.

Robert L. Wilbur (1957) Ph.D., *Associate Professor of Botany*
 Pelham Wilder, Jr. (1949) Ph.D., *Professor of Chemistry*
 William E. Wilkinson (1967) Ph.D., *Assistant Professor of Mathematics*
 Hilda Pope Willett (1948) Ph.D., *Professor of Bacteriology*
 *G. Trevor Williams (1965) Sc.D., *Associate Professor of Mathematics*
 George W. Williams (1957) Ph.D., *Professor of English*
 William Hailey Willis (1963) Ph.D., *Professor of Greek in Classical Studies*
 *Neil L. Wilson (1957) Ph.D., *Professor of Philosophy*
 James F. Wilson (1967) Ph.D., *Assistant Professor of Civil Engineering*
 John Wilson (1968) Ph.D., *Assistant Professor of Sociology*
 Thomas George Wilson (1959) Sc.D., *Professor of Electrical Engineering*
 Cliff W. Wing, Jr. (1965) Ph.D., *Associate Professor of Psychology*
 Orval S. Wintermute (1958) Ph.D., *Associate Professor in Religion*
 Benjamin Wittels (1961) M.D., *Associate Professor of Pathology*
 C. Hilburn Womble (1958) Ph.D., *Associate Professor of Classical Languages*
 Max A. Woodbury (1966) Ph.D., *Professor of Mathematics*
 *Frank W. Woods (1958) Ph.D., *Associate Professor of Forest Ecology*
 †Robert Hilliard Woody (1929) Ph.D., *Professor of History*
 Paul Wortman (1967) Ph.D., *Assistant Professor of Psychology*
 Donald Wright (1967) Ph.D., *Assistant Professor of Mechanical Engineering*
 David O. Yandle (1967) Ph.D., *Associate Professor of Forest Mathematics*
 ‡William P. Yohe (1958) Ph.D., *Professor of Economics*
 §James G. Yoho (1957) Ph.D., *Professor of Forest Economics*
 Charles R. Young (1954) Ph.D., *Associate Professor of History*
 Franklin W. Young (1944-50; 1968) Ph.D., *Professor of New Testament and Patristic Studies in Religion*
 Chester M. Zmijewski (1963) Ph.D., *Associate Professor of Immunology*

Emeritus Professors

Donald Keith Adams (1931) Ph.D., *Professor Emeritus of Psychology*
 Katharine May Banham (1946) Ph.D., *Professor Emeritus of Psychology*
 Lucius Aurelius Bigelow (1929) Ph.D., *Professor Emeritus of Chemistry*
 Edward Claude Bolmeier (1948) Ph.D., *Professor Emeritus of Education*
 Benjamin Boyce (1950) Ph.D., *James B. Duke Professor Emeritus of English*

*Resigned, August 31, 1969.

†Absent on leave, fall semester, 1969.

‡Absent on leave, fall semester, 1969.

§Resigned, January 31, 1969.

Juan R. Castellano (1947) D.F.L., *Professor Emeritus of Romance Languages*
 Benjamin Guy Childs (1924) M.A., *Professor Emeritus of Education*
 Kenneth Willis Clark (1931) Ph.D., D.D., *Professor Emeritus of New Testament*
 Frederick A. G. Cowper (1918) Ph.D., *Professor Emeritus of Romance Languages*
 John S. Curtiss (1945) Ph.D., *James B. Duke Professor Emeritus of History*
 Bingham Dai (1943) Ph.D., *Professor Emeritus of Psychology*
 George Sharp Eadie (1930) Ph.D., *Professor Emeritus of Physiology and Pharmacology*
 Howard Easley (1930) Ph.D., *Associate Professor Emeritus of Education*
 William Whitfield Elliott (1925) Ph.D., *Professor Emeritus of Mathematics*
 Allan H. Gilbert (1920) Ph.D., *Professor Emeritus of English*
 Irving Emery Gray (1930) Ph.D., *Professor Emeritus of Zoology*
 Paul M. Gross (1919) Ph.D., *William Howell Pegram Professor Emeritus of Chemistry*
 George Thomas Hargitt (1930) Ph.D., Sc.D., *Professor Emeritus of Zoology*
 Charles Cleveland Hatley (1917) Ph.D., *Professor Emeritus of Physics*
 Duncan Charteris Hetherington (1930) Ph.D., M.D., *Professor Emeritus of Anatomy*
 Calvin Bryce Hoover (1925) Ph.D., *James B. Duke Professor Emeritus of Economics*
 Jay Broadus Hubbell (1927) Ph.D., *Professor Emeritus of English*
 Wanda S. Hunter (1947) Ph.D., *Professor Emeritus of Zoology*
 William H. Irving (1936) B.A. (Oxon.), Ph.D., *Professor Emeritus of English*
 Howard Eikenberry Jensen (1931) Ph.D., *Professor Emeritus of Sociology*
 Brady Rimbey Jordan (1927) Ph.D., *Professor Emeritus of Romance Languages*
 William Thomas Laprade (1909) Ph.D., *Professor Emeritus of History*
 Charles Earl Landon (1926) Ph.D., *Professor Emeritus of Economics*
 Alan Krebs Manchester (1929) Ph.D., *Professor Emeritus of History*
 Ernest William Nelson (1926) Ph.D., *Professor Emeritus of History*
 Walter McKinley Nielsen (1925) Ph.D., *James B. Duke Professor Emeritus of Physics*
 James G. Osborne (1961) B.S., *Professor Emeritus of Forestry*
 Robert Leet Patterson (1945) Ph.D., *Professor Emeritus of Philosophy*
 Mabel F. Rudisill (1948) Ph.D., *Professor Emeritus of Education*
 David Tillerson Smith (1930) M.D., Litt.D., *James B. Duke Professor Emeritus of Microbiology*

- H. Shelton Smith (1931) Ph.D., *James B. Duke Professor Emeritus of Religion*
- Hersey Everett Spence (1918) *Professor Emeritus of Religious Education*
- W. A. Stumpf (1948) Ph.D., *Professor Emeritus of Education*
- Clement Vollmer (1926) Ph.D., *Professor Emeritus of German*
- Warren Chase Vosburgh (1928) Ph.D., *Professor Emeritus of Chemistry*
- Loring Baker Walton (1929) Lic. es L., Ph.D., *Professor Emeritus of Romance Languages*
- Charles Eugene Ward (1927) Ph.D., *Professor Emeritus of English*
- James Wesley Williams (1937) M.S., *Professor Emeritus of Civil Engineering*
- Robert Renbert Wilson (1925) Ph.D., LL.D., *James B. Duke Professor Emeritus of Political Science*
- Frederick Adolphus Wolf (1927) Ph.D., *James B. Duke Professor Emeritus of Botany*

To the Prospective Graduate Student at Duke University

Several years ago a committee of distinguished scholars was appointed and asked to appraise the state of graduate education at Duke University and indicate guidelines for its future development. I would like to quote briefly from the preamble of their report:

The primary role of a university is to provide a focus for the growth of ideas. Since ideas grow in the minds of men, communication between scholars, between faculty and students—in short, teaching—is the first basic function of a university. But without great ideas to communicate—ideas old and new, traditional and nascent—teaching is an exercise in futility. Therefore, the second basic function of a university must be research, characterized by the spirit of free inquiry and the exploration, analysis, and synthesis of ideas. These two faces of a university are complementary.

Even in the undergraduate college or in the professional school, the student learns best when moved by a spirit indistinguishable from the mood of the scholar engaged in original research. The ideas taught are, in fact, new to the student and therefore fit material for his “original” research. But it is in the graduate school that teaching and research become truly inseparable.

To the student in search of a superior graduate education Duke University has much to offer: excellent research facilities such as an outstanding library, a major computing center, modern laboratories—but above all, a highly productive graduate faculty dedicated to the twin functions of teaching and research. The following pages, and the information they contain, are addressed to the student seeking a soundly based graduate education.

John C. McKinney
Dean of the Graduate School



Courses of Study and Requirements for Degrees

The Graduate School of Duke University now offers the following degrees: Master of Arts (A.M.), Master of Science (M.S.), Master of Science in Nursing (M.S.N.), Master of Education (M.Ed.), Master of Arts in Teaching (M.A.T.), Master of Hospital Administration (M.H.A.), Doctor of Philosophy (Ph.D.), and Doctor of Education (Ed.D.). A program leading to the Master of Business Administration (M.B.A.) is scheduled to begin in September, 1970.

The Master's Degrees

To be considered as a candidate for a master's degree (A.M., M.S., M.S.N., M.Ed., M.A.T., M.H.A.), the graduate student must (1) have made passing grades in the first 12 units of course work, (2) have made a grade of *G* or *E* on at least 3 units of this work, and (3) have received the approval of the major department (or in the case of the M.A.T., of the supervisory committee).

Residence Requirements

Candidates for all master's degrees must spend, as a *minimum*, one full academic year, or its equivalent in Summer Session terms, in residence at Duke University. Those who wish to complete their degrees

wholly in the Summer Session must be in residence for five terms. Depending upon the degree program pursued and the individual student himself, additional time frequently proves necessary. (See section on Residence under Academic Regulations.)

Transfer of Graduate Credits

Under certain circumstances a maximum credit of six units may be allowed for graduate courses completed elsewhere. Units from other institutions for such cases will normally be transferred only if the student has received for them a grade of B (or its equivalent) or better. In any case, the transfer of graduate credit does not reduce the required minimum registration for a master's degree at Duke. In planning a master's program, a student who wishes to transfer up to six units into his program must nevertheless register at Duke for units equivalent to the number he is transferring.

With the approval of both the student's major department and the Dean of the Graduate School, a student who is granted such transfer credit may be permitted to register for as much as twelve units of thesis research instead of the usual six units, or he may be permitted to fill out his schedule with as much as six units of further undergraduate training or six units of required language courses on the undergraduate level. In no case will credit be allowed for extension or correspondence courses.

Time Limits for Completion of Master's Degrees

The master's degree candidate who is in residence for consecutive academic years should complete all requirements for the degree *within two calendar years* from the date of his first registration in the Graduate School. Any candidate must complete all requirements *within six calendar years of his first registration*.

To be awarded a degree in June the student must have completed all requirements, including the recording of transfer credit, by the last day of the final examination period. If a thesis is one of the requirements, it must be submitted to the Graduate School Office by May 1. Candidates for degrees in the Graduate School desiring to have their degrees conferred on September 1, must have completed all requirements as of the final day of the Duke University Summer Session. A candidate completing degree requirements after that date will have his degree officially conferred at the following June Graduation Exercises. (Transfer of credit for work completed at other universities must be recorded by September 15.)

The Thesis

The thesis should demonstrate the student's ability to collect, arrange, interpret, and report pertinent material on his special research problem.

Although a publishable document is not required, the thesis must be written in an acceptable style and should exhibit the student's competence in scholarly procedures. Requirements of form are set forth in the Duke University *Manual of Style for Theses and Dissertations*, revised 1961, obtainable at the Duke University Book Store.

Master of Arts

The Master of Arts degree may be earned either with or without presentation of a thesis. Whether or not a student writes a thesis, however, certain general requirements must be met. If the master's degree requirements are not specified in the departmental heading of this *Bulletin*, a prospective student should inquire directly from the appropriate director of graduate studies.

Prerequisites

As prerequisites to graduate study in his major subject, the student must have completed a *minimum* of 24 semester hours—12 semester hours of approved college courses in that subject and 12 additional semester hours in that subject or in related work. Since some departments require more than 12 semester hours, the student should read carefully the special requirements listed by his major department, which are included as headnotes to the course offerings in this *Bulletin*.

Language Requirements

The Graduate School requires no foreign language for the master's degree. Individual departments, however, may establish a foreign language requirement for their master's program. For methods of satisfying language requirements, see p. 60. The language requirements must be satisfied before the master's examination is taken.

Major and Minor Subjects

In his graduate work the student must present acceptable grades for a minimum of 24 units of graduate courses. Of these, at least 12 units must be in the major subject. A minimum of six units must be in a minor subject or related fields which are approved by his major department. The remaining six units of the required 24 may be taken in either the major or minor department, or in another approved by the major department and by the Dean of the Graduate School. The nature of the additional six units for which he must register depends on whether he is enrolled in a thesis on non-thesis program; i.e., these last six units are earned either with successful submission of the thesis or with such other courses or academic exercises as are approved by the student's depart-

ment. (See options below.) His earned credit for the degree totals a *minimum* of 30 units.

Options for Completing the Program

With Thesis

Preparing the Thesis. All basic requirements for preparing the thesis are described in the *Manual of Style for Theses and Dissertations*, revised 1961, obtained at the Duke University Book Store, West Campus. The quality of paper, form, and binding are prescribed in the *Manual*.

Submitting the Thesis. Four typewritten copies of the thesis bound in snap binders secured through the Graduate School Office must be submitted in approved form to the Dean of the Graduate School on or before May 1 for a June degree, or August 15 for a September degree, and at least one week before the scheduled date of the student's examination. The copies will then be distributed by the student to the several members of the examining committee. Two copies for the Library and one for the adviser will be bound by the Ruzicka Bindery, upon payment of a fee of \$5.00 per volume. The student will state whether or not he wishes more than three so bound.

Without Thesis

The options with which a Master of Arts degree may be completed without presentation of a thesis are determined by the individual departments. Normally a student's committee makes its decision on his degree program after he has completed at least nine units of graded course work. Beyond the 24 units required in major and minor course work, six units may be earned either with additional course work or with other equivalent academic exercises approved by the student's department and committee. Such academic exercises might include an additional three units of graded course work supplemented, for example, by the following: (1) passing an oral examination on a three to five page research prospectus, plus a substantial bibliography on a topic within the student's major field, or (2) successful submission to the committee of two carefully revised term papers, preferably written originally for different instructors and originally earning a grade of G or higher. In any case, the student's total minimum registration will be for 30 units of work, followed by a final examination (see below).

The Examining Committee and the Examination

The instructor who directs the student's program appoints an examining committee composed of himself and two other members of the graduate faculty, one of whom must be from a department other than that of the major. If the student has been permitted to take related work

within the major department, the third member may represent the minor field within the department. Nominations for membership on this committee are submitted for approval to the Dean of the Graduate School at least one week preceding the final examination.

The student's committee administers the examination and certifies whether the student has passed or failed by signing the card provided for this purpose by the Graduate School Office. This card is used to indicate completion of all requirements for the degree. If a thesis is presented, the committee also signs all copies of the thesis, and the candidate then returns the original, the first two carbon copies, and any other copies he wishes bound by Ruzicka, to the Dean of the Graduate School, who has them deposited in the University Library.

Filing the Intention to Graduate

On or *before March 1 for a June degree* or on or *before August 1 for a September degree*, the student must file with the Dean of the Graduate School, on the official form, a declaration of intention to graduate. If degree requirements have been met before the deadlines above, the intention to graduate must be filed one month before the final examination. The declaration of intention gives the title of the thesis or other academic exercises on which the degree candidate will be examined. The declaration must have the approval of the director of graduate studies in the major department, and of the student's committee chairman.

Master of Science

The degree of Master of Science is offered in the four fields of engineering—civil, electrical, mechanical, and biomedical—in forestry, and in physical therapy.

Prerequisites—Engineering

As prerequisites to this degree, the student must have earned a bachelor's degree from an accredited engineering college and have completed a minimum of 12 semester hours of work in the major field.

Prerequisites—Forestry

As prerequisite to this degree, the student must have earned a bachelor's degree which represents an undergraduate program in forestry or an allied field.

Prerequisites—Physical Therapy

As prerequisites to this degree, the student must have earned a bachelor's degree and completed the following course work: 32 semester

hours of laboratory courses in the natural sciences with a minimum of one academic year of chemistry, including organic chemistry, and physics; 15 semester hours in the social sciences, 6 of which must be in psychology; and at least 6 semester hours in mathematics.

Language Requirements

For the Master of Science degree no foreign language is required.

Major and Minor Subjects—Engineering

The work for the Master of Science degree is designed to provide a broad foundation in the fields of civil, electrical, mechanical, and biomedical engineering. The student must present acceptable grades for a minimum of 24 units of graduate courses: at least 12 in course work in his major area of concentration in engineering (not necessarily confined to the offerings of the engineering department in which the student is registered); a minimum of 6 units in a minor subject outside of engineering which lends broad support to his program (usually in mathematical or natural sciences); and the remaining 6 of the 24-unit course requirement in either the major or minor subject, or in an area approved by the major department. The nature of the additional 6 units for which he must register depends on whether he is enrolled in a thesis or non-thesis program, i.e., these last 6 units are earned either with successful submission of the thesis or with such other courses or academic exercises as are approved by the student's department. His earned credit for the degree totals a minimum of 30 units.

Major and Minor Subjects—Forestry

The work for the Master of Science degree is designed to provide a basic foundation in a fundamental area of forestry or in a field closely allied with forestry. A minimum of 30 units of credit is required for the degree, of which 24 units must be in formal courses. Specific course requirements call for a minimum of 12 units in a major field of specialization and 6 units in a minor area of concentration. The major and minor fields are determined without regard to departmental divisions of the University if the interdisciplinary nature of the area of specialization makes such a program of study advisable. The specific program of study is developed by the major professor (thesis supervisor) subject to the approval of the Director of Graduate Studies in Forestry and the Dean of the Graduate School.

Program for the Degree—Physical Therapy

The work for the Master of Science degree is designed to provide a broad foundation in the art and science of physical therapy and op-

portunities for the development of skills in administration and supervision, experience in curriculum development and directed teaching in physical therapy, and advanced clinical education or research experience. The program of study includes 60 units of graduate credit, of which 38 are in courses in physical therapy, 12 are in designated courses in anatomy and physiology, and 10 are in elective courses in related fields. Completion of the prescribed curriculum requires four semesters of full-time work and a summer program of clinical experience which is conducted under faculty supervision in hospitals and other health agencies.

Thesis and Examination

The regulations and options for completing the program and the provisions for examination and an examining committee are the same as those for the Master of Arts degree discussed in the previous section. However, the Department of Forestry requires a thesis for completion of the M.S. degree.

Master of Science in Nursing

Prerequisites

As a prerequisite to the degree of Master of Science in Nursing, the student must have completed a baccalaureate degree program in nursing which was accredited by the National League for Nursing (NLN). Provisional admission may be granted to applicants not fully meeting this requirement.

Program for Degree

The general purpose of the program is to enable and encourage students to explore, develop, and test theories of nursing practice based on scientific processes, to the end that graduates will continue to seek and extend knowledge about nursing. Opportunities are provided for each student to progress toward his goals in a selected nursing specialty, such as gerontological nursing, community mental health, or geropsychiatric nursing. Concentration upon a limited area helps to deepen understanding and afford experience which will serve as a model for continued learning.

Preparation to function as a nurse specialist or teacher is provided through elective courses, theoretical exploration, and experiences appropriate to the needs and interests of the individual student. The program incorporates and encourages independent study, innovative approaches, and evaluative methods.

The student must present acceptable grades for a minimum of 42 units

of graduate courses; 21 in nursing courses, 9 in cognates, and 12 in electives.

Master of Education

Prerequisites

Before a student is admitted to graduate study for this degree, he should have completed, on the undergraduate level, a minimum of 18 semester hours of approved work in education.

Before the degree is conferred the student must have had one year of actual teaching experience, or have met certification requirements by supervised student teaching in an accredited school. Such supervised student teaching may be at either the undergraduate or the graduate level.

The Thesis

The Master of Education degree may be earned either with or without a thesis.

Without thesis. The required work includes a departmental major (administration, counseling, elementary education, secondary education, or teaching the emotionally disturbed) of at least 12 units, and a minor of at least 6 units outside the Department of Education. The remaining 12 units are elective within the area of education and the minor field, but require the approval of the student's major adviser and the Director of Graduate Studies.

Toward the end of his residence the student must pass a comprehensive examination on his departmental major. This examination shall be prepared and conducted by the instructors of the student's major as designated by the Director of Graduate Studies of the Department of Education. Request to take this examination should be made to the Director of Graduate Studies at least two weeks before the date on which the examination is to be conducted.

With thesis. Students who elect this plan are permitted to substitute a thesis for 6 units of the required course work. The thesis subject must be approved by the instructor who is to direct it, and by the Director of Graduate Studies.

In addition to the thesis, the student must present at least 24 units of course credit. Of these, 12 units must be taken in the student's departmental major. Six units, constituting a minor, must be taken outside of the Department of Education. The remaining 6 units are elective within the area of education and the minor field, but require the approval of the student's major adviser and the Director of Graduate Studies.

The regulations governing the thesis are the same as those for the Master of Arts degree.

Recommendation for Teacher Certification

Elementary school teachers who already hold certificates and who desire the recommendation of Duke University for a graduate teaching certificate must include in their master's program a minimum of 12 semester hours in subjects ordinarily taught in elementary school and 12 semester hours in education courses designed to improve them as elementary school teachers.

Master of Arts in Teaching

Prerequisites

The degree of Master of Arts in Teaching is designed for teachers already in service and for recent graduates of liberal arts colleges who wish to teach in a public school, private school, or junior college.

A student should normally have completed a minimum of 12 semester hours in his proposed major subject and an additional 12 semester hours in that or related subjects. Should a student wish to undertake a graduate major different from his undergraduate major, the prerequisites may be modified upon the recommendation of the student's committee and the approval of the Dean of the Graduate School.

Programs for the Degree

Either of two programs may be arranged, in consultation with the student's committee.

1. A major in education of 18 to 24 units and 12 to 18 units in non-education courses (for students seeking certification): a total of 36 units.

2. A major in non-education courses of 18 to 24 units and 6 to 12 units in education (for students already certified): a total of 30 units.

The non-education courses are to be taken in one or more subjects ordinarily taught in the secondary schools. The amount and distribution of this work will be determined by the needs of the individual student. A combined major in biological sciences or in physical sciences is possible in this program. Teachers who have already completed certification requirements must major in a teaching field in their Master of Arts in Teaching program. Students who have not completed certification requirements must major in education.

The Master of Arts in Teaching may be earned with or without the presentation of a thesis. If a student, in consultation with his committee, elects to present a thesis, 6 units of the total of 30 units required will be allotted to thesis research. He will then be required to complete 24 units of course credits. The regulations governing the thesis are the same as those for the A.M. *with thesis*. Candidates for the Master of Arts in Teaching who have not had teaching experience are required to take Edu-

cation 215-216 or 315-316, in which case a minimum of 36 units is required.

The Committee

Each candidate for the degree will be assigned a committee, appointed by the director of graduate studies in the major department or area. This committee will consist of three members, at least one of whom will be from the Department of Education, and at least one from another department. The chairman of the committee will normally be chosen from the department of the major.

Recommendation for Teacher Certification

Secondary school teachers who already hold certificates and desire the recommendation of Duke University for graduate teaching certificates must include in their master's program a minimum of 18 semester hours in their teaching fields and 6 semester hours in courses in education designed to improve them as secondary-school teachers.

Master of Hospital Administration

Prerequisites

The Master of Hospital Administration degree is designed for persons intending to pursue a career of management in hospitals and other health agencies.

No specific undergraduate major is required for participation in graduate studies leading to this degree, but certain courses are prerequisites:

- 1 semester of statistics
- 1 semester of calculus
- 2 semesters of natural sciences
- 2 semesters of economics or political science, or 1 semester of each
- 2 semesters of psychology or sociology, or 1 semester of each
- 2 semesters of accounting, either basic or managerial

In selected cases, students who have not completed all prerequisites may be admitted on a conditional basis subject to completion of deficiencies while completing other requirements of the degree program.

Program for the Degree

The program for this degree includes 36 graduate units, of which 18 are in courses in hospital administration and 18 are in designated courses in business administration, economics, political science, and sociology.

Completion of this program ordinarily requires 24 months. Included is a 12-month administrative residency which is conducted under faculty

supervision in hospitals and other health agencies within commuting distance of the University campus. A portion of the residency is devoted to preparation and presentation of a written management study.

Comprehensive Examination

Successful completion of a comprehensive examination, consisting of both oral and written phases, is a prerequisite qualification for the M.H.A. degree.

Master of Business Administration

Prerequisites

The M.B.A. program is designed for students whose undergraduate work included at least one year of calculus and an educational background adequate for rigorous analysis. Normally, undergraduate majors in such fields as the physical and biological sciences, mathematics, engineering, and the social sciences are well suited for the program. The M.B.A. program is designed to provide a thorough foundation in the concepts and theory that underlie the design, operation, and control of modern complex organizations.

Program for the Degree

The M.B.A. program contains a prescribed core of courses dealing with tools of analysis and the fundamental theoretical foundations for demanding administrative practice. In addition, each candidate elects a set of courses to prepare more specifically for his chosen professional practice.

The M.B.A. requires four semesters of full-time work totaling 64 units of graduate course credit. (See Business Administration section under Courses of Instruction for a more detailed description of the degree requirements.)

Language, Thesis, and Minor Subjects

The M.B.A. program has neither a language nor a thesis requirement. No formal minor subject is required. A project in administrative research and formal writing is required in the fourth semester, and is described in the list of courses as the Practicum.

Examinations and Graduation

On or before March 1, candidates for a June M.B.A. degree are notified of their graduation status, and those students expected to complete the requirements for the degree file their intention to graduate with the

Dean of the Graduate School. Any student required to take master's examinations will be so notified by March 1.

The Doctor's Degrees

Doctor of Philosophy

The Ph.D. degree is essentially a research degree. Although course work is a necessary part of the student's program, the mere accumulation of course credits will not be sufficient for attaining this degree. The granting of the Ph.D. is based primarily upon the student's knowledge of a specialized field of study and upon the production of an acceptable dissertation embodying the results of original research.

Requirements for the Ph.D. Degree

The formal requirements for the Ph.D. degree are as follows: (1) foreign language(s); (2) major and minor courses; (3) supervisory committee for program of study; (4) residence; (5) preliminary examination; (6) dissertation; and (7) final examination. In order to be considered for candidacy for the Ph.D. degree, the student must have passed all of his course work in the first year of graduate study, and on at least nine units of course work in the first year he must have made a grade of *G* or better.

Foreign Languages

A reading knowledge of one foreign language, ancient or modern, is required by the Graduate School. Individual departments may specify which language is required and may require more than one foreign language. If the language requirement is not specified in the departmental heading of this *Bulletin*, a prospective student should inquire directly from the appropriate director of graduate studies. (For methods of meeting the requirement, see Language Requirements.)

A student working toward the doctoral degree should complete the language requirement for that degree by the end of his first year of residence. If he fails to meet the requirement by the end of his third semester of residence, he must register in the appropriate special reading course or courses until he has satisfied the requirement.

The foreign language requirement must be met before preliminary examinations are taken.

Major or Minor

The student's program of study necessarily demands substantial concentration on courses in his major department. It may, however, include

a minimum of six units in a minor subject or related fields approved by his major department. Use of related fields within the major department requires the approval of the Dean of the Graduate School.

Committee to Supervise the Program of Study

As early in a student's course of study as is practicable and *not later than two months before the preliminary examination* the director of graduate studies in the major department will nominate for the approval of the Dean a supervising committee of five, with one member designated as chairman. This committee will include at least three graduate faculty members of the major department and one from the minor. With authorization of the Dean and the Executive Committee of the Graduate Faculty the minor may be constituted of a clearly differentiated division within the department. The committee will draw up a program of study and administer the preliminary examination and, with such necessary changes as are approved by the Dean, the final doctoral examination. The final examination may be administered with a minimum of four members, one of whom must represent the minor.

Residence

The *minimum* registration requirement is 60 units of graduate credit, of which not more than 30 units may be accepted by transfer. Since a full program is 30 units per academic year, the prospective Ph.D. candidate who enters with the A.B. or B.S. degree must plan to spend in residence a *minimum* of two academic years; if he enters with the A.M. degree, his *minimum* residence is one academic year. (For the definition of *residence*, see the section on Residence under Academic Regulations.) If there are undergraduate deficiencies in his program, he may in addition to the minimum requirements be required to take preliminary undergraduate courses for which he will not receive graduate credit. Even if there are no such undergraduate deficiencies, the student's supervisory committee will determine what requirements if any above the minimum the student must meet.

Credit for Summer Work. Credit earned in the Summer Session will not reduce the minimum required residence (see section on the Summer Session).

Time Limitations

1. At the time that the preliminary examination is passed any courses, language certifications, or other credits for advanced standing which are more than six calendar years old will not be accepted toward fulfilling the minimum requirements of the doctoral degree.

2. The student should normally pass the preliminary examination by

the end of his third year of graduate study. If he has not passed it by the end of the third year of full-time registration, he must file with the Dean of the Graduate School a statement, approved by the director of graduate studies in his major department, explaining the delay and setting a date for the examination. Except under unusual circumstances, extension will not be granted beyond the middle of the fourth year.

3. The doctoral dissertation should be submitted and accepted within two calendar years after the preliminary examination is passed. Should the dissertation not be submitted and accepted within four years after the examination, the candidate, with the approval of his committee, may petition the Dean of the Graduate School for an extension of one year. Should this extension be granted and the dissertation not be submitted and accepted within the year, the student to remain a candidate for the degree must pass a second preliminary examination. In such a case, the time limit for submitting the dissertation will be determined by the Dean of the Graduate School and the candidate's committee.

4. In exceptional cases of particular merit, however, and with the approval of the Dean of the Graduate School, the several departments *may* extend the limits of the total elapsed time within which credit will be allowed for courses, the language examinations, and the preliminary examination. The graduate faculty of the departments will have these limits in mind when a student is being considered for admission or readmission to the Ph.D. program, for approval to take the preliminary examination, and for approval to submit the dissertation and take the final examination. In instances of excessive elapsed time, revalidation of credits may be required. The responsibility for requiring such revalidation will normally lie with the department, but the Dean's approval will be necessary.

Preliminary Examination

A student is not accepted as a candidate for the Ph.D. degree until he has passed the preliminary examination. A transfer student who may have passed a preliminary examination elsewhere must nevertheless take the examination at the Duke Graduate School. The examination ordinarily covers both the major and minor fields.

In the summer, a preliminary examination may be scheduled only between the opening and closing dates of the Summer Session.

Privilege of Re-Examination. Should the student fail the preliminary examination, he may apply, with the consent of his supervisory committee and of the Dean of the Graduate School, for the privilege of a second examination to be taken no sooner than three months after the date of the first. Failure on the second examination will render the student ineligible to continue his program for the Ph.D. degree at Duke University.

Reduction in Registration. Because the student who passes the preliminary examination is eligible for a reduction in required registration, he

should assume responsibility for prompt notification of the decision to the Graduate School Office.

The Dissertation

The dissertation is expected to be a mature and competent piece of writing, embodying the results of significant and original research.

Filing Title. One month before the dissertation is presented and not later than March 1 (March 2 if March 1 falls on Sunday) preceding the June commencement at which the degree is expected to be conferred, the student must file with the Dean of the Graduate School, on the official form to be obtained from the Graduate School Office, the title of the dissertation. This title must receive the written approval of both the director of graduate studies of the student's major department and the professor who directs the dissertation.

Form. The basic requirements for preparing the dissertation such as quality of paper, form, and binding are prescribed in the instructions for microfilming and in the *Manual of Style for Theses and Dissertations*, revised 1961, which may be obtained from the Duke University Book Store, West Campus.

Submitting Dissertation. The dissertation must be completed to the satisfaction of the professor who directs it. Four typewritten copies bound in snap binders secured through the Graduate School Office must be deposited with the Dean of the Graduate School on or before April 15 preceding the June commencement when the degree is to be conferred. The dissertation must be submitted to the Graduate School Office at least seven days before the scheduled date of the student's examination.

Publication on Microfilm. All doctoral dissertations are published on microfilm through University Microfilms, Ann Arbor, Michigan. Authors may also copyright them, if they wish. The abstract will be published in *Dissertation Abstracts*.

In brief, all copies of the dissertation, the original in clean type, will remain unbound except for spring binders. Ten copies of an *abstract*, carefully written and not more than 600 words long, are submitted when the dissertation is first presented to the Graduate School Office. A non-returnable dissertation fee of \$25 is charged for microfilming. If copyright is desired, an additional fee is charged. The original and two copies will be bound by the Ruzicka Bindery. The fee is \$5.00 per volume. The student may request that more than the three copies be so bound.

Final Examination

The final oral examination shall be primarily on the dissertation. Questions may, however, be asked in the candidate's major field. Except in unusual circumstances approved by the Dean a final examination will not be scheduled when school is not in session.

If a student fails his final examination, he may be allowed to take it for a second time, but not sooner than six months from the date of his first. Permission to take the second examination must be obtained from the professor who directed the dissertation and from the Dean of the Graduate School. Failure to pass the second examination renders the student ineligible to continue work for the Ph.D. degree at Duke University.

Deposit of the Dissertation

After passing the examination, the candidate brings to the Graduate School Office the original and first two carbon copies of the dissertation, properly signed, and any other copies he wishes bound by Ruzicka. At this time he signs the microfilming agreement and pays such binding, microfilming, and copyright fees as are due.

Doctor of Education

The Doctor of Education degree is a professional degree planned for those who are, or intend to become, school administrators, supervisors, directors of instruction, curriculum consultants, college teachers of education, or other professional personnel.

Requirements for the Ed.D. Degree

The candidate for the Ed.D. degree must meet the same requirements as the candidate for the Ph.D. degree except as otherwise specified here. In addition to the uniform requirements, the candidate for the Ed.D. degree (1) must have had at least two years of experience in educational work or complete successfully a supervised internship or practicum; (2) must present strong letters of appraisal and recommendation from persons well qualified to speak with authority of his abilities; and (3) must present himself, if possible, for a personal interview.

Persons who are primarily concerned with meeting requirements set by North Carolina for the advanced certificate for administrators and supervisors must request and secure admission for doctoral study.

Residence Requirements

Regulations concerning residence requirements, grades required during the first year of graduate study, and the preliminary examination are the same as those for the Ph.D. degree (see section on Doctor of Philosophy).

Foreign Languages

There are no foreign language requirements for the Ed.D. degree.

Program of Work

The candidate for the Ed.D. degree will choose as his major field (*a*) educational administration and supervision, (*b*) counseling, (*c*) curriculum and instruction, or (*d*) education of emotionally disturbed children.

In all cases candidates will take a minimum of 36 units in the major and related areas and a minimum of 12 units in one or more minor areas.

Dissertation

The candidate must write a dissertation, for which the formalities of presentation, including its defense in a final examination, are the same as those for the Ph.D. degree. The dissertation must be a mature piece of writing embodying the results of significant and original research—in essence, a contribution to knowledge, or several closely related problems growing out of the student's professional responsibilities. In either case it must demonstrate the candidate's ability to investigate and report on a significant phase of education in his major field.

Publication on Microfilm. The dissertation will be published on microfilm, as is the dissertation for the Ph.D.

Final Examination

Regulations for the final examination are identical to those of the Ph.D. degree.

Special and Cooperative Programs

Center for the Study of Aging and Human Development

The primary aims of the Center have been to encourage and support fundamental research concerned with the processes and health problems of aging; to train investigators for research in the problems of aging; and to develop a source of scientific knowledge in the field of aging for state and local government as well as for private groups and individuals.

The Center conducts a two-year program for predoctoral or postdoctoral fellows who desire to pursue research training in some aspect of the behavioral sciences and psychophysiology in aging and human development. Through faculty seminars and independent work these fellows are enabled to focus on a chosen aspect of the life spectrum. Methodology and acquisition of specialized skills are stressed in addition to involvement in individual research. Under this program, continuance of research training support for a third year is possible. Resources available include the Psychophysiology Laboratory, research programs in behavioral medicine, child psychiatry, and geriatrics, as well as staff and facilities in anatomy, biochemistry, economics, endocrinology, obstetrics and gynecology, physiology, preventive medicine, psychiatry, and sociology, among others. Inquiries should be addressed to the Training Di-

rector, Center for the Study of Aging and Human Development, Duke University, Durham, North Carolina.

Biomedical Engineering Program

The Graduate School offers an interdisciplinary program in biomedical engineering leading to the M.S. and Ph.D. degrees. The purpose of this program is to encourage the optimum combining of engineering and biomedical course work with an interdisciplinary research topic so that the graduates of this program can contribute at the most advanced professional level to the interdisciplinary field of biomedical engineering.

The major research areas available include: biomechanics; biomedical materials; biomedical modeling; data acquisition and processing; and neural networks. Information about graduate fellowships may be obtained from Dr. Theo C. Pilkington, Chairman, Division of Biomedical Engineering.

Center for Commonwealth Studies

The Center for Commonwealth Studies was established at Duke University in 1955 and has received financial support from the Carnegie Corporation of New York, the Rockefeller Foundation, and the Ford Foundation. Its objectives are:

1. To encourage and stimulate by financial assistance and other means the research interests of individual scholars in Commonwealth affairs, European institutions and their expansion, and development studies, and
2. To establish at Duke University a center whose facilities will promote interest in research relating to the Commonwealth, provide the materials for basic research, and encourage research by Commonwealth and American students and faculty.

The Center awards fellowships to graduate students from Australia, Canada, and New Zealand who propose to study the Ph.D. degree in economics, history, or political science at Duke University. National selection committees in each of the mentioned countries facilitate the selection of fellows.

Each spring the Center sponsors a joint seminar for graduate students in economics, history, and political science. The objective of this seminar is to encourage a broad approach to developments within the Commonwealth. In addition the Center sponsors occasional lectures at the University by distinguished Commonwealth scholars.

Financial assistance is provided to students and faculty at the University for field research in Commonwealth countries. Studies resulting from research sponsored by the Center are frequently published by the Duke University Press in the Commonwealth-Studies Series. The Center also distributes in its reprint series selected published articles that relate to the Commonwealth. Inquiries should be addressed to the Executive Secretary, Center for Commonwealth Studies, Duke University, Durham North Carolina.

Program in Comparative Studies on Southern Asia

The Program in Comparative Studies on Southern Asia was established at Duke University in 1961 following a grant from the Ford Foundation to the Center for Commonwealth Studies to enable it to develop a research and training program in that area. In 1963 the University entered into a contract with the United States Office of Education and sponsors a South Asian Language Training and Area Center under the provisions of Title VI of the National Defense Act. The basic purpose of this program is twofold: to facilitate research on the political, historical, economic, and socio-cultural development of Commonwealth countries in Southern Asia (India, Pakistan, Ceylon, Malaysia, and Singapore) and to provide for the systematic training of graduate students in economics, education, history, political science, religion, and sociology and anthropology, with special emphasis on the area.

The graduate student, in addition to meeting the requirements of the department in which he is enrolled, is expected to take Hindi-Urdu or another major South Asian language, the cognate courses in other departments, and to undertake field research in the preparation of his dissertation.

The program awards each year a limited number of predoctoral fellowships under the conditions specified above. Awards carrying the same expectations are also made under the NDEA Title VI language fellowships offered by the United States Office of Education.

Facilitation and support of research activities by members of the Duke University faculty and graduate students are important aspects of the program's activities. It supports through travel grants and subsistence allowances field research by persons affiliated with the University. Research grants for faculty and students are also available from the American Institute of Indian Studies and the United States Office of Education. Research facilities include those materials received as a result of the University's participation in a library acquisitions program under the terms of Public Law 480.

The program has undertaken the publication of three series: hard-cover monographs, reprints of articles of note dealing with the Southern Asia

region, and a series of occasional papers. Inquiries should be addressed to the Executive Secretary, Program in Comparative Studies on Southern Asia, Duke University, Durham, North Carolina.

Cooperative Program in Teacher Education (Secondary) (M.A.T. degree)

Selected graduates of liberal arts colleges who have not completed a teacher preparation program will be admitted to the Cooperative Program in Teacher Education to complete simultaneously in their graduate programs requirements for a teacher's certificate and additional training in the field to be taught. Full-year internships with salary are arranged with cooperating public and private school systems. Students admitted to this program are required to attend the first Summer Session before their internship. This program is limited to students preparing to teach in junior or senior high schools. For materials describing this program, write to the Graduate School or to Director, Cooperative Program in Teacher Education, Department of Education.

Cooperative Programs with the Consolidated University of North Carolina

Interchange of Registration

(See Registration, the Reciprocal Agreements with the Consolidated University of North Carolina and with North Carolina Central University.)

Library Exchange

Students of both the University of North Carolina and Duke University are granted certain library privileges in the libraries of each university. Books unavailable in one library may be procured on short notice through an interlibrary loan service.

The Cooperative Program in the Humanities

The Cooperative Program in the Humanities, jointly managed by Duke University and the University of North Carolina at Chapel Hill, aims at expanding and improving activities in the humanities in the two universities and throughout the region. The program was established in 1963, with offices on both campuses, and receives substantial financial support from the Ford Foundation.

The central feature of the program is a cooperative exchange between the two universities, on the one hand, and a number of liberal art colleges, on the other. Academic-year research leaves are made possible for faculty members from humanistic departments of liberal arts college located in Virginia, North Carolina, and South Carolina. These scholars are known as Humanities Fellows. Each fellow has a significant, clearly defined research project. As partial replacements for the Humanities Fellows during their year of leave, the program, whenever possible, offers the colleges advanced graduate students from the two universities. This arrangement permits a certain number of Duke and University of North Carolina students to have both a full year of teaching at a college or university in the area, and a duty-free year afterward, with a stipend of \$3,000 to enable them to complete their degrees.

Inquiries may be directed to the Program Office, 341 Perkins Library, Duke University.

Cooperative Program in Russian and East European History

The graduate schools of Duke University and the University of North Carolina offer a cooperative program leading to the M.A. and Ph.D. degrees in Russian and East European studies. Students admitted to one institution are encouraged to enroll in those courses at the other institution that are advantageous to their programs, and to utilize the libraries and facilities of both universities. The holdings of the two libraries in Russian and East European materials are substantial and complementary. Both libraries have a policy of purchasing all significant published works in Slavic history, economics, government, geography, literature, and linguistics. Other joint activities include a monthly colloquium involving the personnel of the two institutions and distinguished visiting scholars.

The University Program in Genetics

Because of the unifying role that genetics has played in development of the biological sciences in the twentieth century, and its relationship to sciences outside the conventional limits of biology, the appointment of geneticists to several academic departments has been a natural occurrence. In order to maintain these mutually beneficial relationships, and to provide for the coherent development of genetics throughout Duke University, the University Program in Genetics was established. The faculty of the program is made up of scientists who hold appointments in various departments; through their cooperation, an interdepartmental curriculum has been developed. Thus, students in any of several departments may specialize in genetics under the auspices of this interdisciplinary program.

A number of predoctoral traineeships supported by the National Institutes of Health will be awarded each year by the program. Inquiries concerning the program and traineeships should be addressed to the Director, The University Program in Genetics, Nanaline H. Duke Building. For a listing of the faculty and the curriculum, refer to the section on Genetics under Courses of Instruction in this *Bulletin*.

Hispanic Studies Program

The Graduate School offers an interdepartmental program of Hispanic studies leading to the A.M. and Ph.D. degrees. Students may write their theses and take their degrees in history, economics, political science, sociology, or Hispanic languages and literatures. The purpose of the program is to make possible desirable combinations of courses on the Hispanic world in these related disciplines and to bring to bear more strength of the faculty upon the training of a single candidate. This may be achieved through a judicious use of minors or by such special arrangements as may from time to time become necessary.

The Duke University Library holdings have been built up to facilitate graduate work and research in Hispanic-American cultural history, inter-American relations, economic history, politics, and Spanish-American literature. These collections are being constantly enlarged.

Materials-Fields-Mechanics Research Program

The Graduate School offers an interdisciplinary program in materials research leading to the M.S. and Ph.D. degrees. Students write their theses and take their degrees in one of the engineering departments but have access to the resources of an interdepartmental faculty, comprising the Materials Research Group. The purpose of the program is to encourage and facilitate research on the interactions of materials with various fields (stress, thermal, electromagnetic, fluid, etc.).

Requests for information about specific research areas available may be obtained through the directors of graduate studies in Civil, Electrical, and Mechanical Engineering.

Medical Scientist Training Program

The Medical School and the Graduate School cooperate in offering a program which leads to both the M.D. and the Ph.D. degrees. It is the purpose of this program to produce individuals competent both as

clinicians and as basic scientists. Graduates of the program are expected to gravitate toward faculty positions in the medical schools of this country and to contribute significantly, through their research efforts, to the advancement of medical practice. Applicants to this program must satisfy the admissions requirements of the Medical School and of the science departments of the Graduate School and should be able to offer some evidence of a serious interest in basic research. This program enables its participants to achieve both degrees in one year less than would be required to obtain them outside of this program.

The first two years of study are spent in the Medical School mastering the core curriculum of preclinical (first year) and of clinical (second year) sciences. The participants then devote full time to graduate studies in one of the basic science departments of the University. When the requirements for the Ph.D. are completed, the students return to the Medical School for an additional year of clinical experience and thus complete their requirements for the M.D. degree. Funds are available which provide for payment of stipends and tuition for the duration of the students' participation in this program. Six of the twelve students who enter this program each fall are fully funded in this manner. The remaining students are ordinarily provided with such funds only during the years spent in earning the Ph.D. degree.

Students enrolled in the Ph.D. phase of the M.D.-Ph.D. program are assessed full fees (based on the normal, 15-semester hour registration) in the Graduate School. These students, paying full fees in the Graduate School, are allowed to carry from one to four units in the Medical School at no extra fee. Students enrolled in the M.D. phase of the M.D.-Ph.D. program pay full fees in the Medical School. Such students, because of the nature of the elective program, may carry from one to six units in the Graduate School without extra fees.

Inquiries concerning this program should be directed to Dr. Irwin Fridovich, Associate Director, Medical Scientist Training Program.

The Population Studies Program

The Population Studies Program at Duke University was established in 1963 as a joint enterprise of the Departments of Economics and Sociology and was charged with both educational and research functions in the area of demography and human ecology.

Training under the auspices of the program leads to a Ph.D. degree within the Departments of Sociology or Economics with a specialization in population studies. Two training programs are available, one in each department. Each is designed to provide an integrated and cross-disciplinary training in the common speciality area of population studies

The bearing of economic and sociological theory upon the analysis of demographic phenomena is emphasized.

In addition to cross-departmental courses, program unity is produced through a Population Studies Seminar. This seminar, which is non-credit and informal, is attended by advanced students and by faculty in both departments. The seminar provides briefing on demographic research conducted by both faculty and students in the two departments. It also serves as a vehicle for a number of visiting lecturers in demography each semester.

Graduate fellowships for students in the program are available. Inquiries may be directed to the director of graduate studies in either of the participating departments.

Program in Medieval and Renaissance Studies

The program is designed especially for students studying for an advanced degree in art, classics, English, German, history, philosophy, religion, and Romance languages. It is organized in terms of four areas of study (fine arts, history, language and literature, and philosophy-religion) based on the graduate courses currently offered at Duke University. In all cases the student's program will be tailored to his interests and needs, but he will normally concentrate on one or two of the above areas. Each program will be approved by the student's departmental adviser and by the Committee on Medieval and Renaissance Studies. The precise number of courses to be taken in medieval and renaissance studies will vary according to the requirements of the department in which the student is enrolled. Students are normally expected to have a reading knowledge of Latin and at least one other relevant language. At the same time, students will be encouraged to gain a knowledge of languages—ancient, medieval, and modern—and other skills, such as paleography, pertinent to their interests.

Oak Ridge Institute of Nuclear Studies

Duke University is one of the sponsoring universities of the Oak Ridge Institute of Nuclear Studies located at Oak Ridge, Tennessee. The graduate research program at Duke has available to it all the facilities of the Oak Ridge National Laboratory and the cooperative supervision of student research by the staff at Oak Ridge.

Fellowships in several fields of science are available to qualified applicants.

Graduate Fellowship Program. On application by a university the

Institute awards fellowships to candidates for the master's and doctor's degrees. The student uses the fellowship to conduct his thesis research in an Oak Ridge laboratory.

AEC Special Fellowships. These are available in the fields of (1) nuclear science and engineering, (2) health physics, (3) advanced training in health physics, and (4) industrial hygiene.

The application deadlines differ for different fellowships. Further information may be obtained from Lewis E. Anderson, Department of Botany.

Social Systems Simulation Program

This is an interdisciplinary program to stimulate the use of model building and computer techniques in the social sciences. Although an outgrowth of the Econometric Program, it is broadly based in that it involves faculty participation from business administration, economics, education, mathematics, political science, psychiatry, psychology, and sociology. It provides resources and facilities to predoctoral students pursuing Ph.D. work in a variety of fields. Inquiries should be addressed to the Director, Social Systems Simulation Program, Social Science Building, Duke University, Durham, North Carolina.

Stochastic Systems Program

A cooperative program in stochastic systems analysis is sponsored by the Department of Electrical Engineering at Duke and the Department of Statistics of the University of North Carolina at Chapel Hill, in cooperation with the Departments of Mathematics at the two institutions. The program is designed for graduate students interested in applications of stochastic processes and statistical inference. A student interested in this area may enroll in any one of the sponsoring or cooperating departments in a program leading to a master's or a Ph.D. degree, awarded through that department. Mutual interaction between the departments is provided by complementary course offerings and cooperative student advising. The student may thus arrange a variety of programs within the general stochastic systems area, emphasizing the more theoretical or the more applied aspects at his discretion. In addition to the courses regularly available, special courses will be offered on various topics. A stochastic systems seminar is an integral part of the program. Further information concerning this program may be obtained from either Dr. R. B. Kerr, Department of Electrical Engineering, Duke University, or Dr. C. R. Baker, Department of Statistics, University of North Carolina, Chapel Hill.

Resources for Graduate Study

The Libraries

The new section of the William R. Perkins Library has shelf space for 1,500,000 books, seats for 1,250 readers, and a staff of 200. When renovation of the old building is completed in the spring of 1970, the entire complex will provide room for 2,500,000 books and 2,100 readers. The reader stations include about 700 carrels, 200 closed and 500 open, of which 475 are in the new building.

Four of the six floors of the building are above ground. On the main floor—at ground level—are the reference and loan departments, bibliography, current periodicals, interlibrary loan, and all units of technical processing. Documents, newspapers, microtext collection, and the microphotography laboratory and other copying facilities are located on the floor below. The administrative offices and graduate reading room are on the second floor, and manuscripts and archives on the third. Twelve small reading and study rooms are provided in the stacks for the departments in the humanities and social sciences that grant the doctorate. Four seminar rooms are also provided in the stacks.

Microphotography and photographic services utilize modern equipment for reproducing printed and manuscript materials and for reading of materials in the microtext collection. A special room has been set aside for film readers.

The combined University libraries contained 2,036,441 volumes in the

summer of 1969. In addition to the collection in the Perkins Library, there are eight school and departmental libraries with holdings as follows: Divinity, 141,000 volumes; Engineering, 43,000 volumes; Law, 163,000 volumes; Medical Center, 98,500 volumes; Woman's College, 178,000 volumes; Biology-Forestry, 99,000 volumes; Chemistry, 25,000 volumes; Mathematics-Physics, 37,000 volumes. Ninety-five thousand volumes were added in 1968-69. Approximately 10,200 periodicals and 167 newspapers are received currently.

The extensive resources of the Library for research students may be suggested by the following special collections:

The Trent Collection of Walt Whitman, containing the first and all other important early editions or issues of *Leaves of Grass*; books and articles of Whitman biography and criticism; nearly 300 manuscripts and 400 letters; and pictures, sheet music, and other miscellanea.

The George Washington Flowers Collection of books, manuscripts, pamphlets, and newspapers on all phases of Southern history.

The Arents Collection of several hundred volumes relating to the culture and production of tobacco and the manufacture and distribution of tobacco products.

The James A. Thomas Collection of books on Chinese history and culture.

The Guido Mazzoni Library, a collection of approximately 23,000 volumes and 67,000 pamphlets covering the whole range of Italian literature, with special strength in the nineteenth century.

The Gustave Lanson Library of 12,000 books and monographs on French literature.

Latin-American Collections, built around a special Peruvian library of 7,000 books and manuscripts, a Brazilian library of several thousand volumes, and an Ecuadorian library of 2,000 volumes, supplemented by strong collections of the public documents of these and other Latin-American countries.

The Robertson Library of Philippiniana.

The Frank C. Brown Folklore Collection, consisting of about 38,000 manuscript pieces, 1,400 vocal recordings, and 650 musical scores of North Carolina folklore.

The Strisower Library of international law, numbering about 5,000 volumes, with many rare books and periodical files.

The Trent Collection in the History of Medicine (Medical Center Library), containing about 3,000 books and 2,500 manuscripts with special strength in anesthesia, anatomy, English medicine, vaccination, yellow fever, pharmacy, and medical biography.

The Holl Church History Library, dealing primarily with the period of the Reformation.

The Frank Baker Collection of Wesleyana and British Methodism, consisting of 1,500 editions of the works of John and Charles Wesley,

8,000 volumes concerning all phases of the development of British Methodism, 4,000 volumes relating to the religious and social background of British Methodism, and 4,000 manuscript pieces by the Wesleys and their coadjutors and by British Methodists of the last 200 years.

Collections in English and American Literature, where emphasis has been placed principally on the eighteenth and nineteenth centuries, with the collections of Swinburne, Tennyson, Rossetti, and Bryant, significant groups of annotated copies and first editions of Coleridge and Byron, the Carroll Wilson collection of Emerson, some 5,000 items of eighteenth-century English poetry and prose, and the Paul Hamilton Hayne library of American literature.

In addition to these and other special collections, the libraries contain excellent files of United States federal and state documents, public documents of many European and Latin American countries, and publications of European academies and learned societies. The newspaper collection, with 13,300 volumes and 15,000 reels of microfilms, has several long eighteenth-century files, strong holdings of nineteenth-century New England papers, and of ante-bellum and Civil War papers from North Carolina, South Carolina, and Virginia; there are also many European and Latin American papers. The manuscript collection of 3,900,000 items is particularly strong in all phases of the history, politics, and social and economic life of the South Atlantic region, though it includes also significant papers in English and American literature, and several notable medieval manuscripts in both Greek and Latin.

Science Laboratories

Botanical and Zoological Laboratories

Facilities for graduate study in the Departments of Botany and Zoology are located on the West Campus. The Biological Sciences Building, completed in 1962, contains well-equipped modern laboratories for teaching and research in the various fields of botany, forestry, and zoology. Special facilities are available, such as animal rooms, greenhouses, dark-rooms, refrigerated and controlled environment laboratories, electron microscopes, Van de Graaff accelerator, X-ray machines, radiation and radioisotope equipment, and other modern research facilities. Extensive facilities for experimentation in the environmental control of plant growth are available in the new phytotron adjacent to the botany greenhouses.

The Herbarium, containing over 360,000 specimens, is worldwide in scope and includes notable collections of mosses and lichens.

Unique assets for teaching and research are the Sarah P. Duke Gardens, conveniently located on the West Campus; the four-acre experimental plot and field laboratory developed by the Department of Botany; the

phytotron; the Duke Forest, comprising 8,500 acres of woodland adjacent to the West Campus; the field station for the study of animal behavior; and the Duke University Marine Laboratory at Beaufort, North Carolina. Duke University, through the Botany and Zoology Departments, is a member institution of the Organization for Tropical Studies in Costa Rica, a facility providing excellent opportunities for course work and research in the tropical flora and fauna.

Scholarships for advanced study during the summer months are maintained at the Highlands Biological Laboratory, Highlands, N.C.; at the Marine Biological Laboratory, Woods Hole, Massachusetts; and at the Duke University Marine Laboratory. Requests for information concerning scholarships at the Highlands Laboratory should be addressed to the Botany Department, those at Woods Hole to the Zoology Department, and those at Beaufort to the Duke University Marine Laboratory.

The Phytotron

The phytotron, officially known as the Duke University unit of the Southeastern Plant Environment Laboratories, is connected to the biology building on West Campus. The facility is administered by the Botany Department. The phytotron is an integrated series of plant-growth rooms, chambers, and greenhouses. Over fifty separately controlled environments provide more than 3,000 square feet of plant growing space. The controlled units consist of artificially lighted rooms with temperature and humidity control, reach-in chambers, and six temperature-controlled greenhouses. By using the conditions in various day and night combinations an exceptionally large number of environments can be obtained for testing the growth responses of plants. The phytotron also includes research laboratories and facilities for studying and monitoring the physiological processes of plants.

Research space in the phytotron is available to graduate students and faculty at Duke and to members of other educational and research organizations. For information concerning awards and research space, write to the Director, Dr. Henry Hellmers, Department of Botany, Duke University, Durham, North Carolina 27706.

Marine Laboratory

The Duke University Marine Laboratory is located at Beaufort, North Carolina, one and one-half miles from the open ocean. The physical plant includes five well-equipped research buildings, three classrooms, and four dormitories. The laboratory provides excellent facilities for graduate courses in botany, chemistry, geology, and zoology and for thesis research throughout the year. Special research and training facilities for field work in marine biology and biological oceanography include two

motor vessels and a 118-foot biological research vessel *Eastward*, with specialized apparatus for collecting and environmental measurements.

Six National Science Foundation Predoctoral Traineeships in biological oceanography and one Bureau of Commercial Fisheries Educational Grant in marine biology are available to advanced graduate students during the academic year. Other awards are usually available. For example, in the summer of 1969 twenty-five National Science Foundation Predoctoral Awards were offered for course or research work in marine biology at the Marine Laboratory. For information concerning awards, courses, and research space, write to the Director, Dr. John D. Costlow, Duke University Marine Laboratory, Beaufort, North Carolina 28516.

Animal Behavior Station

Located less than one mile from the campus, the 80 wooded acres of the station provide facilities for studies of penned, free-ranging, and caged animals. These facilities include sound-proof observation chambers, barns, aviaries, and pens for large mammals and birds, and two waterfowl ponds. A new and extensive facility for the study of prosimian primates (both simulated natural habitats and cages) has just been completed. For information regarding research space or research assistantships in animal behavior, write to Dr. P. H. Klopfer, Department of Zoology.

Physics Laboratories

The Physics Building, comprising about 130,000 square feet of floor space, is devoted to the research and instruction of the Departments of Physics and Mathematics. An additional 27,000 square feet of space are provided in the new Nuclear Physics Building completed in 1968 and located adjacent to the Physics Building. Graduate students are provided with office space in one of these two buildings.

In addition to the lecture halls and the elementary laboratories, there are instructional laboratories for work in electronics and advanced physics.

About half the building is devoted to special laboratories for research in microwave spectroscopy, atomic, nuclear, high energy, low temperature, and solid state physics. Special equipment includes microwave spectrographs operating up to 500,000 megacycles; one 4 MEV and one high resolution 3 MEV Van de Graaff accelerator, a 30 MEV cyclotron/tandem Van de Graaff accelerator; a helium liquefier, cryostats, magnets, and associated equipment for research down to the millidegree Kelvin temperature range; a Sigma-5 and a DDP-24 computer used for automatic measurement and processing of bubble chamber film in the High Energy Physics Laboratory; and two DDP-224 computers used to collect and process data in the Nuclear Structure Laboratory.

The Physics-Mathematics Library contains an unusually complete selection of books and periodicals. A large, well-equipped instrument shop staffed by nine instrument makers, four electronic technicians, and a glass blower is in the building.

Chemistry Laboratories

The Chemistry Department occupied a new building in 1969. Named after Dr. Paul M. Gross, a distinguished member of the faculty for many years, the building contains three and one-half floors which provide 146,440 square feet of total area. The usable space is over twice that of the original building, and will allow considerable growth of departmental research programs as well as faculty and student body. The entire building is air-conditioned and is electrically heated.

The Chemistry Department is well equipped for performing research in many areas of current interest. Among instruments available for general use in various research problems are Varian A-60 and T-60 nuclear magnetic resonance spectrometers, a Bendix time-of-flight mass spectrometer Model 12, many recording spectrophotometers for infrared and ultraviolet-visible studies, and numerous gas chromatographs, both analytical and preparative. Some other instruments of primary importance to specific research projects include Varian V-4502-12 and V-4502-15 electron paramagnetic resonance spectrometers, a Varian HR-60 nuclear magnetic resonance spectrometer, a Carey Model 14R ultraviolet-visible spectrophotometer, a Durrum-Jasco ORD/UV/CD-5 recording spectropolarimeter and circular dichroism recorder, polarographs, a fluorescence spectrophotometer, a flame photometer, and optical equipment for photochemical and kinetic studies. Equipment for X-ray crystallographic investigations is extensive and includes a Rigaku-Denki low-angle X-ray diffractometer, a Kratky U-Bar camera, a General Electric XRD-5 diffractometer, a Picker automated full-circle X-ray diffractometer, and single crystal precession and Debye-Scherrer powder cameras. The Chemistry Department also has direct access to two other major instruments located in the Research Triangle Park. These are the A.E.I., Ltd., MS-902 high resolution double focusing mass spectrometer and the IBM 360-75 computer, the latter linked by cable to the Duke University Computation Center.

The department has a machine shop, an electronics shop, and a glass-blowing shop. The facilities of the Duke University Marine Laboratory on the coast at Beaufort, North Carolina, are available for specimen collection and processing in studies of organic chemicals of marine origin.

Psychology Laboratories

The Psychology Department occupies new and fully renovated quarters, comprising about 53,000 square feet of floor space, which house its main

laboratories, seminar rooms, classrooms, and special facilities. The building is completely air-conditioned for year-round research and study. For the use of graduate students and staff, the department houses a periodical reference room with an extensive collection of current and bound journals and monographs in psychology and related subjects. In addition to general purpose laboratories, there are special facilities for studies of animal behavior; soundproofed and electrically shielded rooms for use with human and animal subjects; specially equipped rooms for the study of visual perception; electrophysiological recording rooms; a histological laboratory and surgery; and photographic darkrooms. The social psychology unit (joint with the Department of Sociology) contains observation, communication, and recording facilities for the study of social interaction. There is an extensive suite of interview and observation rooms for the study of human personality and clinical processes. Automatic computation equipment is available for all research purposes. A departmental shop, with competent technicians in charge, is maintained to provide specialized mechanical and electronic apparatus. Other facilities for research and teaching are available in the laboratories and clinics of the adjacent Duke Medical Center.

A number of clinical installations for adults and children, devoted to an extensive range of clinical and guidance problems, cooperate with the department in providing facilities for research and training. In addition, the department operates a Preschool Laboratory for four- and five-year old children. The department cooperates with the Department of Zoology in the operation of an 80-acre field station in the nearby Duke Forest for the study of animal behavior in natural settings. (See Animal Behavior Station.)

Computation Center

The Duke University Computation Center provides the University faculty and students with a facility for research and instruction.

The center is presently equipped with an IBM System 360 Model 30 (24K bytes, two tapes, card reader, printer, Calcomp plotter) which is connected by high-speed telephone lines to an IBM System 360 Model 75 (512K bytes, 2,000K bytes LCS, two 2314 disk facilities, five tapes, card reader, printer) located at the Triangle Universities Computation Center which is in the Research Triangle Park. In addition, there exists a medium speed terminal (IBM 2780 card-reader and printer), located in the School of Engineering, and several low speed terminals (such as IBM 1050 terminals, IBM 2741 keyboard terminals, and teletypewriters) spread throughout the campus.

The Triangle Universities Computation Center (TUCC) is a nonprofit corporation formed jointly by Duke University, North Carolina State University at Raleigh, and the University of North Carolina at Chapel Hill.

The purpose of the TUCC is to make available to the three universities computing capabilities equal in quality to the finest available.

Faculty members at Duke may use the facilities of the Computation Center by filling out an application for computer services. All users of the Computation Center facilities are urged to obtain funds to pay for computer services. However, any user unable to obtain grant funding may ask for financial support from the University at the same time he applies for the services.

More specific information regarding the availability and use of the facilities of the center may be obtained from the Director of the Computation Center.

Engineering Research Laboratories

The laboratories of the three departments which comprise the School of Engineering contain a wide range of basic equipment that finds general application in the several fields of specialization. In addition, each laboratory contains selected items of highly sophisticated equipment used to support advanced research in areas of particular emphasis. The exceptionally fine facilities available for instruction and research are suggested by the following brief listing of selected items to be found in the three departments.

Civil Engineering: closed-loop, electrohydraulic dynamic loading system capable of applying pulses of any shape, of magnitudes up to 5,000 pounds, and controlled in either force or displacement modes in frequencies from zero to 100 cycles per second; vacuum-forming facilities for structural shell models; high-speed digital strain-measuring and recording systems; ultra-high-pressure triaxial shear apparatus for confining pressures up to 100,000 p.s.i.; high-speed camera for studying explosions and similar phenomena; large-aperture research polariscope; reflective photoelastic polariscope; sustained-loading facility for long-duration studies of prestressed concrete.

Electrical Engineering: high-resolution ($7\text{\AA}$) electron microscope with heating and tilting stage; stereo optical microscopes; ion-pumped bakeable ultra-high-vacuum unit; helium dewars and cryostats; 9.5-inch magnet and regulated power supply with complete nuclear magnetic resonance system; spin-echo spectrometer; X-ray diffraction diffractometer with monochromator attachment furnaces; environmental test chambers; analog computer facility; multichannel tape and strip-chart recorders; complete x-band microwave instrumentation system; sampling oscilloscope; cryomagnetic facility for susceptibility measurements; Digital Equipment Corporation Linc 8 computer.

Mechanical Engineering: digital data acquisition system, with high speed scanner and punched tape output; FM-AM instrumentation tape recorder; spectrum analyzers; storage and dual-beam oscilloscopes; oscil-

lograph; X-Y and strip-chart recorders; temperature, pressure, strain, force, and acceleration transducers; electrodynamic shaker table; sound room with associated sound measuring and analyzing equipment; experimental vacuum transport system (1800 ft. x 1 ft. diameter); fuel research engine; materials laboratory with injection molding, high temperature microscope, stereo-zoom research metallograph, heat treating and arc melting furnaces.

Available to graduate students in all three departments of the School of Engineering are also the Central Service Shop facilities of the School, as well as those located elsewhere on the campus.

The School of Engineering houses an IBM Model 2780 medium-speed card-reader punch and printer which communicates directly with the IBM System 360/Model 75 computation facility that is located in the Triangle Universities Computation Center in the adjacent Research Triangle Park.

Forestry Sciences Laboratory

The establishment of the U.S. Forestry Sciences Laboratory research facility of the Southeastern Forest Experiment Station in the Research Triangle Park near Durham provides an unusual opportunity for complementing the research programs of students in the Department of Forestry. Specialized research projects in forest entomology, pathology, physiology, and soils are currently underway at the laboratory. The staff of the laboratory is available for consultation and seminar participation, and may offer advice to students conducting research in the Department of Forestry. Arrangements may also be made for students to conduct certain aspects of their research at the laboratory.

Duke Forest

The Duke Forest consists of approximately 8,500 acres of land, most of which are adjacent and easily accessible to the University campus. Situated in the lower Piedmont region and composed of second-growth shortleaf pine, loblolly pine, and hardwoods, the forest is representative of the various types of timber growth and soils found throughout the region. Through placing the forest under intensive management for forestry purposes, substantial progress has been made in developing the educational work and research in forestry.

The proximity of the forest to the laboratories, greenhouses, phytotron, and library facilities of the University provides an excellent opportunity for advanced study and research in forestry. Research particularly in the fields of forest ecology, forest meteorology, forest soils, forest management, properties of wood, forest-tree physiology, forest entomology, and forest pathology is well underway. Several members of the botany and zoology staffs are also engaged in research in the Duke Forest.

Student Life

Living Accommodations

Duke University strives to provide comfortable, attractive living accommodations for graduate-level resident students, both married and unmarried.

The Graduate Center houses men and women enrolled on a full-time basis in the Graduate School and the professional schools. Graduate women are also assigned to Hanes Annex, a residence hall and to Town House Apartments located between the West and Woman's College campuses.

The Graduate Center houses 197 male graduate students, 56 women graduate students, and 117 women undergraduates. Commons facilities on the main floor are shared by men and women.

Hanes Annex has 39 beds for graduate and allied health students. The second floor of this building is used by seniors in the School of Nursing. Commons areas are jointly used by the two groups.

Rooms in residence halls are normally rented for the academic year, but for no period less than one semester or specified term.

Town House Apartments include 30 two-bedroom units, each furnished for three graduate women students. Two students occupy the master bedroom and the third occupies a smaller bedroom. A living room, kitchen, and one and a half baths complete these attractive living units.

The University now leases 104 two- and three-bedroom apartment

units for use by married graduate students. As compared with similar apartment properties in the Durham area, rental of the Duke-leased units provides financial advantage to most students accepting leases through the University Department of Housing.

Detailed information about University housing facilities for single and married students, including rental rates, will be provided upon request by the Department of Housing Management, Duke University, Duke Station, Durham, N.C. 27706.

Rooms in residence halls and spaces in Town House Apartments or other rental units may be reserved by applicants only if they have been accepted by the Graduate School, and after the required \$25 room or security deposit has been paid to the University. The initial room or security deposit is required with the application and is held until the room or apartment is vacated. Application forms and detailed information on graduate housing will be mailed when the Graduate School has notified the Department of Housing Management of official acceptance of the student. Single women may express a choice for the type of housing desired. Completed applications for rooms and apartments are to be returned, with required deposits, to the Department of Housing Management, Duke Station, Duke University, Durham, N.C. Assignment priority is established by the date of receipt of completed applications with deposits in this office.

Regulations governing occupancy of rooms and apartments will be provided by the Department of Housing Management at the time application forms are forwarded to accepted students. Occupants within each type of housing are expected to comply with the appropriate regulations.

For the cost of housing and for details on rental refund policy, see the section on Housing in the Financial Information chapter.

Food Services

Food service on both the Woman's College Campus and the West Campus is cafeteria style. The dining facilities on the West Campus include one straight-line cafeteria with multiple-choice menus, a free-flow service area which includes cafeteria counters as well as a grill, and a table service dining room called The Oak Room where full meals and *a la carte* items are served. The Cambridge Inn, which is a self-service snack bar also located in the West Campus Union, is open from 9:00 a.m. until 12:30 a.m. each day except Saturday. All types of snack and sandwich items are available here. The Graduate Center has a cafeteria open at meal hours, and a coffee lounge which is open until 11:00 p.m. Because of the large number of those served in the dining halls, it is not possible to arrange special diets for individual students.

For cost of food services, see the chapter on Financial Information.

Services Available

Medical Care

The complete medical facilities of the Duke University Medical Center are available to all members of the University community. To secure the benefits of the Student Health program, a graduate student during the term or semester in which the illness occurs must (1) in the Summer Session term be registered for at least one unit of research or three units of course work, (2) prior to completing minimum residence requirements be registered for at least nine units per semester and thereafter as long as full-time status is maintained. (See the section on Residence.) Students are not covered during vacations and their dependents and members of their family are not covered at any time. Care is provided for men at the Student Health Office in Duke Hospital and for women at the Woman's College Infirmary and in the Student Health Office.

The service provided includes hospitalization in Duke Hospital, when recommended by the Hospital staff, to a limit of thirty days in the fall and spring semesters—six days in the Summer Session; medical and surgical care under the supervision of a senior physician or surgeon; drugs, X-ray work, and ward nursing. Students pay for board while in the hospital. Excluded from the service are refraction of eyes, treatment of teeth and all chronic and pre-existing conditions, and elective surgery.

Off-campus injuries and accidents are not covered by Student Health. Graduate students are urged to carry adequate health insurance to supplement Student Health program services. If students have insurance providing hospitalization, surgical, or medical benefits, the benefit shall be applied to the cost of their medical care.

Students whose course load entitles them to full coverage under the Student Health program are eligible for a complementary insurance policy which then comprises protection for the entire calendar year. Concerning this complementary policy, information may be obtained from the Dean of the Graduate School. Foreign students are required to hold this or another acceptable policy.

Student Activities

Graduate students new to Duke University are welcomed to use such recreation facilities as swimming pools, tennis courts, golf course, and to affiliate with choral, drama, and religious groups. They may become junior members of the American Association of University Professors and may affiliate with Phi Beta Kappa and social fraternities. Wives of graduate students may join the very active Graduate Wives Club.

A full program of co-curricular and recreational activities is presented

by the University Religious Council, Y.M.C.A., Y.W.C.A., Student Union, student government organizations, and clubs. Most programs are open to the entire University community. Inquiries should be directed to the Student Activities Office, 202 Flowers Building.

The Information Center, Page Box Office, coffee house, publications offices, art gallery, meeting rooms, lounges, music listening rooms, and recreational facilities are located in the Flowers and Union Buildings.

The Duke University Counseling Center

Through the Counseling Center, the University provides a professional counseling service designed to aid students in gaining a better understanding of themselves and the opportunities available to them. Counseling is available in the areas of career planning, educational opportunities, and personal and social adjustment.

The center maintains files of educational and vocational information related to career planning, graduate educational programs and fellowships, and study aids.

National and University-wide testing programs are administered by the center. A continuing program of research in the areas of counseling and testing is also carried on by the staff of the center.

Office of Placement Services

Duke University maintains an Office of Placement Services which acts as a liaison between the University and potential employers in business and industry, education, and government. All services are offered without charge to Duke students and alumni. The staff is available to talk with graduate students about their future professional plans. Graduate students who wish to register with the office are offered an opportunity to assemble a complete dossier of academic records and recommendations to supplement applications for positions and to have a permanent file for future reference. Pertinent recommendations are far easier to accumulate during the time a student is enrolled at Duke. Interviews with representatives visiting Duke are scheduled throughout the year through the Office of Placement Services for those students who have registered.

Research and Publications

The several departments of the University are devoted to research as well as to instruction. Since the University exists for the promotion and diffusion of knowledge, attention is rightly placed in the Graduate School on research activities.

To further the University's obligation to promote and diffuse knowledge, the President annually appoints a University Council on Research,

which receives applications from members of the various faculties for subsidies in support of research. Vigorous and forward-looking policies of this Research Council have initiated and encouraged the completion of many substantial and important research projects.

The Duke University Press is a significant agency in the diffusion of knowledge. Created in 1925 as a successor to the Trinity College Press, the Duke University Press continued the publication of the *South Atlantic Quarterly*, published at Trinity College since 1902, and in 1926 revived the *Hispanic-American Historical Review*, which had been founded and published from 1918 to 1922 by a group of scholars interested in Hispanic America. In 1929 *American Literature* was begun with the cooperation of the American Literature Group of the Modern Language Association. This journal was followed in 1931 by *Ecological Monographs*, and in 1932 by *Character and Personality* (since 1945 the *Journal of Personality*). In 1935 the Press began the publication of the *Duke Mathematical Journal*. Since 1948 it has published *Ecology*, the official journal of the Ecological Society of America. In 1969 it began the publication of the *History of Political Economy*.

The Press, since its organization, has published more than four hundred volumes. Included among these are six series: American Sociological Forum, Duke Historical Publications, Duke Studies in Religion, Lilly Endowment Research Program in Christianity and Politics, the Program in Comparative Studies on Southern Asia, and largest of all with thirty-six volumes, the Duke University Center for Commonwealth Studies Publications. In the broadest sense, the policy of the Press is to make available to the public any scholarly work that merits publication, though special attention is given to works in fields of knowledge cultivated by the University.

The Law School of Duke University publishes *Law and Contemporary Problems*, *The Duke Bar Journal*, and *The Journal of Legal Education*.

Visiting Scholars

The libraries and, to the extent practicable, other facilities of Duke University will be made available to faculty members of colleges and universities who wish to spend a period of time on the campus in pursuit of their scholarly interests. No fees will be charged such visitors unless they wish to participate in activities for which a special fee is assessed. Room and board may be arranged for at the regular rates in the dormitories and dining rooms. Dormitory space is usually available during the summer months. Inquiries concerning residence for visiting scholars should be directed to the Dean of the Graduate School.

Admission

Students Requiring Admission

Admission is required of (1) all students who intend to pursue study toward a degree offered by the Graduate School, (2) all other students who desire credit for whatever purpose for graduate courses—except students who register as Special Students in the Summer Session. Students who have discontinued a program of study after earning a master's degree here must by letter request permission of the Dean to undertake a doctoral program.

Prerequisites

A student seeking admission to the Graduate School of Duke University must have received an A.B. or B.S. degree (or the equivalent in the case of foreign students) from an accredited institution. His undergraduate program should be well rounded and of such quality as to give positive evidence of capacity for graduate study. Normally he should have majored in the area of his intended graduate study. Many departments (see Courses of Instruction) list specific prerequisites. Students are urged to anticipate the language requirement and are reminded that Educational Testing Service Graduate School Foreign Language tests in French, German, Russian, and Spanish are offered to undergraduate and graduate students at many centers on nationally uniform dates (see Language Requirements).

Procedures

A student seeking admission to the Graduate School should request the Dean of the Graduate School to send an application blank. This should be filled out completely and returned promptly. In addition the student should provide the following supporting documents: (1) two copies of a transcript or transcripts of all his undergraduate and graduate work mailed directly by the registrar to the Dean; (2) as soon as possible, two supplementary transcripts showing completion of work in progress when the earlier transcript was made; (3) three letters of recommendation, written on the forms provided, by persons best qualified to judge him as a prospective graduate student and mailed directly to the Dean; and (4) scores on the Graduate Record Examination, as indicated below.

All applicants except foreign students applying from outside the United States, non-degree students, and former students in the Graduate School must include the application fee of \$10.00 in check or money order payable to Duke University.

Graduate Record Examination

Scores on the Graduate Record Examination, particularly the Aptitude Test, are strongly recommended in all departments and must be submitted if the test has been taken. Scores on the Graduate Record Examination may be requested of any applicant whose record is marginal and must be submitted by all applicants for a fellowship. Information on times and places of Graduate Record Examinations can be provided at the applicant's college or by the Educational Testing Service, Princeton, New Jersey 08540, or Berkeley, California 94704. Departments that require scores of all applicants are listed below.

<i>Departments</i>	<i>Aptitude</i>	<i>Advanced</i>
Anatomy	×	
Anthropology	×	
Biochemistry	×	×
Botany	×	×
Business Administration ¹		
Chemistry	×	×
Classics	×	
Economics	×	×
English	×	×
Forestry	×	
Geology	×	
German	×	
History	×	
Mathematics	×	

¹ Applicants to the Graduate School of Business Administration are required to take the Admission Test for Graduate Study in Business, administered by the Educational Testing Service.

<i>Departments</i>	<i>Aptitude</i>	<i>Advanced</i>
Microbiology	×	×
Music	×	×
Pathology ²	×	×
Philosophy	×	
Physical Therapy	×	
Physics	×	×
Physiology	×	×
Political Science	×	
Psychology	×	
Religion	×	
Romance Languages	×	×
Sociology	×	×
Zoology	×	×

² If the candidate does not already hold a doctoral degree, he will be required to take the GRE.

Additional Procedure for Foreign Students

Fully qualified students from outside the United States are welcomed to take courses in the Graduate School and in many instances to study toward a degree. In applying for admission the foreign student should, in addition to the information required of all students, submit with his application (1) if his native language is not English, certification of ability to use English through scores on tests provided by the Educational Testing Service (TOEFL), the University of Michigan Language Institute, or the American University Language Center, (2) a statement showing financial arrangements for the proposed term at Duke, and (3) a statement by a qualified medical doctor describing any emotional or physical illness the applicant has had during the previous five years.

All foreign students whose native language is not English will be examined during their first registration period for competence in the use of oral and written English. Until competence is determined, admission and arrangements for an award involving teaching must remain provisional. Students found to lack the necessary competence will be required to enroll in the non-credit course called English for Foreign Students and to reduce their course or research program three units. Passing this examination or the course, if it is required, will not meet degree requirements for a foreign language. (See Language Requirements for Foreign Students.)

Notification of Status

When admission is approved, the student will receive a letter of admission and an acceptance form. The process of admission is not complete until the statement of acceptance has been returned.

Applicants who are admitted will be offered full admission, provisional admission, or non-degree admission. *Provisional admission* is offered to students who (1) appear to warrant admission but do not fully com-

ply with admission requirements for a trial period of one semester or a minimum of 12 hours of course work, or (2) are admissible except that the application lacks a letter of recommendation, a supplementary transcript, required test scores, or some other required information. *Non-degree admission* is offered to students who (1) have no intention of taking an advanced degree at Duke University but wish to take courses for accreditation, for transfer to other institutions, or for other purposes, or (2) do not fully meet admission requirements but wish to further their academic interests. Graduate credit earned under provisional status may be applied toward an advanced degree at Duke University if and when the student is granted full admission; graduate credit earned under non-degree status may not be applied toward an advanced degree at Duke University.

Deadlines for Applications

It is the applicant's responsibility to make certain that his application is completed and in order before the dates specified. Because applications cannot be reviewed until all supporting documents are filed, applications should be submitted at least *two weeks* before the closing dates listed below:

Fall semester, admission and award.....	February 15
Fall semester, admission only.....	August 3
Spring semester, admission only.....	January 1
Summer Session,* First Term.....	May 12
Summer Session,* Second Term.....	June 19

*Students seeking admission to the Graduate School for study in the Summer Session should make application to the Dean of the Graduate School as well as to the Director of the Summer Session.

Financial Information

Tuition and Fees

The Graduate School awards such financial aid as fellowships, scholarships, and assistantships. The several departments engage part-time instructors who may be graduate students. The Controller of the University, however, has sole responsibility for paying stipends to students, collecting from them such fees as are due, and making special arrangements for prorating fees.

Estimated Expenses in the Academic Year

The following table represents an estimate of a graduate student's basic expenses for one academic year for a full program of work. These figures do not include allowances for recreation, travel, clothing, and other miscellaneous items which vary according to the needs and tastes of the individual.

	<i>Low</i>	<i>Moderate</i>	<i>Liberal</i>
Tuition	\$1890.00	\$1890.00	\$1890.00
Room Rent*	325.00	325.00	420.00
Board	550.00	600.00	650.00
Laundry	40.00	45.00	50.00
Books	70.00	90.00	110.00

*In the Graduate Center.

Tuition and Fees in the Academic Year

The following table shows the tuition and fees collected from all students. All charges for each semester are due and payable, unless otherwise specified, at the time of registration for that semester and are subject to change without notice. No student is admitted to classes until arrangements have been made with the Bursar of the University for the settlement of his tuition and fees.

Tuition (\$63.00 per unit).....	\$945.00
Athletic fee, optional, per year, not including federal tax, payable in the fall semester.....	25.00
Binding fee, three copies of thesis or dissertation, other copies optional, \$5.00 a copy.....	15.00
<i>In absentia</i> fee, due on date of registration, one unit per semester.....	63.00
Late registration fee.....	10.00
Microfilming fee, doctoral degree only, upon final submission of dissertation.....	25.00

Tuition for a full semester program of 15 units amounts to \$945.00. Part-time tuition is computed at the rate of \$63.00 per unit. Except as indicated on page 55 (Change of Registration), no refund of tuition will be made after the day of registration except in the event the student involuntarily withdraws to enter the armed services or dies during the course of the semester.

Debts

Failure to pay bills on or before the due dates will debar the student from class attendance until the account is settled in full. No records are released and no student is considered by the faculty as a candidate for graduation until he has settled with the Bursar for all indebtedness.

Special Tuition Rates for Teachers and Others

The Graduate School recognizes a special obligation to encourage the following types of students in their professional and personal advancement: (1) members of the faculties and administrations of the neighboring public schools and colleges, currently engaged in *full-time* school work while taking courses in the Graduate School, (2) ministers of neighboring churches, (3) wives of Duke faculty members, (4) *full-time* employees of Duke University who are paid on a monthly basis *throughout* the year and have been employed for two years. The reduced tuition rates specified below do not apply to teachers and ministers while on leave of absence, nor to holders of fellowships, scholarships, or graduate and research assistantships, nor to part-time instructors.

Persons eligible for the reduced tuition rate must meet the admission standards required of all graduate students and must be admitted to the Graduate School. They may enroll for one or two courses per semester (in no case totaling more than 7 units) upon payment of a fee of \$5.00 for registration for each semester and tuition of \$31.50 per unit of credit or an audit fee of \$31.50 per course. Residence requirements cannot be fulfilled at the reduced rate.

Audit Fee

In a semester in which a student registers and pays fees for nine units or more, he may audit one course without charge. Should he be permitted to audit a second course or should he be registered for less than nine units, the audit fee is \$31.50 per course.

Transcript

A student who wishes to transfer his credits from Duke University to another institution may request transcripts of his record. A minimum fee of one dollar, payable in advance, is charged for a single copy. A charge of fifty cents will be made for each additional copy on the same order. Requests should be directed to the Central Records Office.

Fee Adjustment with Change of Registration

Although tuition and fees are due and payable on the date of fall and spring registration, under certain circumstances the Bursar may arrange for proration of these charges. For fee adjustment arising from change of registration, see Change of Registration on page 55.

Stipends and Income Tax

Ordinarily stipends awarded under fellowships and scholarships are not subject to income and Social Security tax. However, a portion of the award to graduate assistants and research assistants may be subject to both. The Graduate Office will supply detailed information.

Living Accommodations

Housing

Rooms in residence halls are normally rented for the academic year, but for no period less than one semester or specified term. The rental charge for each person assigned to a double room in the Graduate Center

is \$325.00 for the academic year, and in Hanes Annex, \$355.00 for the same period. A limited number of single rooms are usually reserved for returning students.

Each student assigned to the Town House Apartments is currently charged \$495.00 for the academic year on the basis of three individuals to an apartment. Utility charges are included in these rates.

Rates for apartments will be provided upon request by the Director of Housing Management.

Rooms in residence halls, Town House Apartments, and apartment complexes may be reserved by applicants only if they have been accepted by the Graduate School and only after the required \$25.00 room or security deposit has been made with the Duke University Bursar. This initial deposit is held until the room or apartment is vacated.

No refund on residence hall room rent or the rent for spaces in Town House Apartments is made to students who withdraw after the date of registration, except for those who involuntarily withdraw to enter the armed services. Such refunds will be made in accordance with the University's established schedules. Rental rates are subject to change prior to the beginning of the 1970-71 academic year.

For further information on housing facilities, see Living Accommodations in the chapter on Student Life.

Food Services

Food service, on both the Woman's College Campus and the West Campus, is described under Living Accommodations. The cost of meals approximates \$2.50 to \$3.00 per day, depending upon the needs and tastes of the individual.

Motor Vehicles

Each student possessing or maintaining a motor vehicle at Duke University shall register it annually at the beginning of the fall semester. If a student acquires a motor vehicle and maintains it at Duke University after academic registration, he must register it within five calendar days after operation on the campuses begins. Resident students are required to pay an annual parking fee of \$30.00 for each automobile and \$10.00 for each two-wheeled motor vehicle. If a vehicle is removed from the campus permanently prior to February 15 and its decal returned to the place of registration by that date, there will be a partial refund on the registration fee.

At the time of registration of a motor vehicle, the following documents must be presented: (a) state vehicle registration certificate; (b) valid

driver's license; (c) satisfactory evidence of automobile liability insurance coverage with limits of at least \$10,000 per person and \$20,000 per accident for personal injuries, and \$5,000 for property damage, as required by the North Carolina Motor Vehicle Law.

Student Aid

The principal forms of graduate student financial support available at Duke University are fellowships, scholarships, assistantships, part-time instructorships and tutorships, loans, and part-time degree-related employment within University agencies.

Application for Awards

Prospective Students

Persons applying to the Graduate School for admission and award (see application form) will receive consideration for all suitable forms of financial aid available in the Duke departments in which they choose to do their major study. Unless specifically called for in the descriptions below, it is *not* necessary to designate on the application form the desire to be considered for a particular award (e.g., NDEA Title IV Fellowship, NSF Traineeship) or to make inquiry separate from the application for admission. Applications for admission and award, along with all supporting documents, must be submitted on or before February 15. Notification of awards offered other than assistantships will be sent in late March. Late applications will be considered, should any vacancies occur in the list of appointees.

Further information and application forms may be obtained from the Dean of the Graduate School, Duke University.

Current Students

Students currently enrolled in the Graduate School who desire consideration for financial assistance in the ensuing academic year should make their desire known to the director of graduate studies in their major department by filing in the Graduate School Office an Application for Graduate School Award. This application should be filed by February 15. Former students not currently enrolled who plan to resume their studies in the ensuing year and who wish consideration for an award should also file this application. Application forms are available in the Graduate School Office and in the departments. Decisions are generally announced in late March.

Payments to Holders of Awards

Payment of stipends to graduate students holding awards begins around September 30, and will be made the last of each month thereafter. Award holders should inquire in their departments to ascertain the particular arrangements associated with their awards.

Fellowships

University Fellowships

University Fellowships funded by Duke University are available to students in the departments of the Graduate School for study during the academic year. Stipends range from \$2,400 to \$3,890. In 1969-70 forty-eight graduate students held these fellowships.

Endowed Fellowships

Through special endowment funds, approximately twenty James B. Duke Fellowships and one Angier B. Duke Memorial Fellowship with stipends (level I and II) of \$4,500, level III, \$3,000; three Ottis Green Foundation Fellowships in Humanities or Social Sciences of \$2,600; four Gurney Harriss Kearns Fellowships in Religion ranging up to \$3,500 are available. Students are nominated for these fellowships by their departments and selection is made by faculty committees.

Federal Fellowships and Traineeships*

National Defense Education Act, Title IV Fellowships. Duke University participates in this program, the purpose of which is to encourage and assist graduate students to prepare for careers as teachers in the nation's colleges and universities. The fellowships are three-year awards, with twelve-month stipends of \$2400, \$2600, and \$2800 in the three years, plus cost of tuition and non-refundable fees. Eligible dependents receive allowances of \$500 for the year. In 1969-70 there were 140 students holding these fellowships. Nominations for these awards originate in the department of major study.

National Defense Education Act, Title VI Fellowships. The purpose of this program is to encourage persons to undertake advanced training in modern foreign languages and in related area studies not commonly taught in the United States for the purpose of developing nationwide competence in such languages and the areas in which they are spoken. World areas in which National Defense Foreign Language Fellowships are offered at Duke University are South Asia and Eastern Europe. In addition to pursuing the normal work toward their degree, fellows must

*U.S. citizenship is generally a requirement for eligibility.

engage during their tenure in intensive study in a language of the world area. The fellowships carry academic year stipends of \$2250, plus tuition and allowances of \$600 for each eligible dependent up to four. In 1969-70, thirteen students at Duke University held NDFL Fellowships. Interested persons should obtain a separate application form from the director of graduate studies in their major department.

National Science Foundation Graduate Traineeships. Through the National Science Foundation, Duke University makes available graduate traineeships to outstanding students who intend to pursue studies in the biological, physical, and social sciences. Award benefits are stipends of \$2400, first year level; \$2600, intermediate level; and \$2800, terminal year level, all for twelve-month tenure. Stipends are prorated if a nine-month tenure is chosen. Benefits also include tuition and dependent's allowances of \$500. Twenty-nine students held graduate traineeships in 1969-70. Nominations for traineeships originate in the department. A smaller number of summer traineeships are available to students who have been teaching assistants during the academic year.

United States Public Health Service Traineeships. Several departments, under training grants from the United States Public Health Service, offer traineeships to outstanding students pursuing work toward the doctoral degree in the supported fields of study. Award benefits are generally comparable to those of N.S.F. Graduate Traineeships, but interested students should consult separate departmental announcements for details of the program. In 1969-70, 187 students held USPHS Traineeships.

Special Fellowships

Cokesbury Graduate Awards in College Teaching

These awards, sponsored by the Board of Education of the Methodist Church, are designed to assist graduate students who are committed to a Christian philosophy of higher education and who intend to teach in college. The applicant must have been a member of the Methodist Church for at least three years, and must have been accepted for or be currently pursuing a program of graduate studies at one of the Methodist-related universities, including Duke University, approved for this program. Awards, for one year, vary in amount from \$500 to \$2,500.

Application must be completed before February 15. Further information and application forms may be obtained from the Dean of the Graduate School.

Charles W. Hargitt Research Fellowship in Zoology

The Charles W. Hargitt Research Fellowship in Zoology is devoted to the promotion of research in the field of cellular studies. It may be

awarded to postdoctoral candidates or established investigators who desire to engage in research and to outstanding predoctoral candidates in support of their graduate training. The recipient will be expected to engage in full-time research or training and will have to do departmental duties. Research facilities will be provided. Appointment is for one year, with the possibility of reappointment.

Inquiries and applications should be addressed to the Chairman, Charles W. Hargitt Fellowship Committee, Department of Zoology.

Shell Fellowships

In African Studies. Two fellowships are available to qualified students in social sciences who are preparing for careers in the State Department, including the foreign services of the United States, the United Nations, or other international agencies, or in research and teaching in international affairs in academic institutions within the United States. They must be citizens of the United States or presently residing permanently in the United States and intending to become citizens. The fellowships are intended to cover the expenses of field research in the preparation of doctoral dissertations. The stipend for each fellowship is \$4,000 plus a reasonable amount for transportation expenses. Inquiries should be made to the Executive Secretary, Center for Commonwealth Studies, Duke University.

Exchange Fellowships with the Free University of Berlin

Duke University has an exchange arrangement with the Free University of Berlin which will provide fellowships for two graduate students to work during the regular academic year in Berlin. Departments will submit nominations to the Dean of the Graduate School before February 15.

Fellowships and Graduate Scholarships in Forestry

Information regarding special fellowships and graduate scholarships in forestry may be obtained from the Dean of the School of Forestry, Duke University, Durham, North Carolina.

Scholarships

University Scholarships

University Scholarships funded by Duke University are available to students in the departments of the Graduate School for study during the academic year. Stipends range from \$850-\$2,700. In 1969-70, 113 students held University Scholarships.

Summer Scholarships

A small number of Summer Scholarships up to \$300 are available to students who were engaged in full-time study during the academic year and wish to pursue full-time study during the Summer Session. Interested students should apply by letter to the Dean of the Graduate School.

Assistantships

Graduate Assistantships

Appointments as graduate assistants carry a total stipend up to \$4,200 for the academic year. The value of stipend is determined by the fraction of time given to assisting, the qualifications of the assistant, and the nature of work assigned. In 1969-70, 97 students held Graduate Assistantships.

Research Assistantships

Appointments are for predoctoral candidates whose special training and qualifications enable them to serve as assistants to individual staff members in certain departments. Stipends may be up to \$4,200, depending on the assisting time required. In 1969-70, 119 students held Research Assistantships.

Part-time Instruction

Several departments offering graduate work make use of exceptionally qualified graduate students as part-time instructors, tutors, and teaching assistants. These students are usually able to register for a graduate program of nine units a semester.

Loans

Interested students of good academic standing may apply for Duke University loans either under the National Defense Education Act or from Duke University sources. These loans usually bear lower rates of interest than commercial loans. Application should be made to Mr. W. O. Petty, Jr., 102B Allen Building, Duke University.

Because University loan funds are not large enough to handle the number of requests, students are encouraged to inquire concerning loan possibilities with the Higher Education Assistance Corporations in their home states, or with a lending institution near the student which may be a participant in the Federal Guaranteed Loan Program. Low interest loans under this program have provisions similar to those sponsored by the National Defense Education Act.

University Registration and Regulations

Registration

Who Must Register

All students must register (1) who enter course work or residence for credit; (2) who have completed minimum requirements for an advanced degree, but continue to use the facilities of the University in their research; (3) who have *in absentia* status; and (4) who wish merely to audit a course or courses.

Registration Periods

After the applicant has received notification of his admission to the Graduate School and has returned his statement of acceptance of admission, he may present himself for registration. During the registration periods, announced in this *Bulletin*, he first confers with the director of graduate studies of his major department, who prepares and signs a course card, listing the course work to be taken during the semester. The student then presents this course card to registration officials, who enroll him officially in his courses. After his first registration period as a current student he will preregister for subsequent semesters at the stated times

for preregistration. Failure to preregister incurs the penalty for late registration. *Former students* who intend to register to resume a degree program must give the department and the Dean notice of this intention two months before registration.

Late Registration. All students are expected to register or preregister at the times stated in this *Bulletin*. Those registering late, including those who are obliged to register *in absentia*, are subject to a late registration fee of \$10.00.

Change of Registration. During the academic year within a period of *fourteen days* from the day of registration, registration may be changed with the approval of the director of graduate studies if no reduction in fee is entailed, or, if fees are to be refunded, only with the approval of the Dean. A period of five weeks from the date of registration is provided for changes resulting from passing a preliminary examination. During the first thirty days from the registration date, the only permissible change is dropping course-seminar registration and adding equivalent units of research, with the approval of the director of graduate studies, the instructor of the course, and the Dean.

Academic Regulations

*Residence**

Although ideally graduate study consists principally of individual reading, research, and laboratory experimentation under guidance, academic progress in the United States is generally measured and recorded in terms of course hours and credits. Credit for courses and seminars, research, and residence, and corresponding tuition and fees are stated in terms of units. One unit is equivalent to one semester hour. The term *residence* designates full-time study and research in close proximity to the facilities provided, as opposed to part-time study incidental to a full-time occupation. For purposes of satisfying the residence requirement of the various degrees, residence of one year is defined as two successive academic semesters of no less than nine units registration each semester. (See the chapter on the Summer Session for residence required of master's candidates engaged solely in summer study.)

Course Load

A graduate student is considered fully registered when he enrolls for the maximum credit his program requires. Required registration is set in consideration of the student's obligation to teach or assist and the stage

*See also section on Requirements for Degrees.

he has reached in fulfilling his degree requirements. In the academic year normal registration for the *resident doctoral* student who does not hold an appointment as part-time instructor or assistant or does not engage in part-time work is 15 units a semester or 30 units an academic year. The normal registration for the *resident doctoral* student who holds such an appointment or undertakes such work is either 12 units or a minimum of 9 units, depending upon the number of hours a week he is required to devote to such duties. The resident doctoral student carries such normal registration through the semester in which he passes the preliminary examination. If he remains in residence, he continues to register for a minimum of 3 units a semester until the dissertation is accepted. If he elects to go out of residence, he registers for 1 unit a semester *in absentia* in order to keep his program active.

The resident student engaged in a master's program requiring a thesis registers as though he were a resident doctoral student. However, once he has completed all requirements except the thesis, he may reduce his registration to three units per semester. If he decides to go out of residence, he registers for one unit *in absentia*. Regulations pertaining to a resident student engaged in a master's program requiring no thesis are identical to those described above for the doctoral student until the semester in which his course requirements will be satisfied. At that point, he may reduce his registration to the number of hours necessary for completion of his degree program.

In the Summer Session six units a term is maximum registration. Students resident in the academic year who wish to continue study and use of University facilities including Student Health during the summer must register for one unit in the first Summer Session term. This registration provides use of these facilities for both terms.

The registration of one unit a semester *in absentia* provides occasional consultation with the thesis or dissertation supervisor. It may be waived for military duty or serious problems of health. Except in the semester in which a final examination is scheduled, every student is allowed two semesters of *in absentia* registration without fee provided that the student is a master's degree candidate who has completed his course and language requirements or is a doctoral candidate who has passed his preliminary examination. The student qualifying must register at the proper time each semester as *in absentia-no fee*. The student who takes advantage of this provision while completing a master's program may not again use it should he proceed into a doctoral program.

It is necessary to be a fully registered student according to the regulations listed above in order to establish eligibility for library carrel and laboratory space, for student housing, for University and some outside loans, for Student Health service (including the voluntary Eaves plan coverage), and for reporting status for military duty.

Credits Earned Outside This Graduate School

1. *Graduate Credit Earned before the A.B. Degree Is Granted.* Ordinarily no credit will be allowed for graduate courses taken before a student has been awarded his A.B. or B.S. degree. However, an undergraduate student at Duke University, who at the beginning of his final semester lacks no more than nine semester hours of fulfilling the requirements for the A.B. or B.S. degree, may obtain permission from the Dean of the Graduate School to enroll for graduate courses sufficient to bring his total program to fifteen hours a week. Such graduate courses will be credited toward the A.M., M.S., M.Ed., or M.A.T. degree, provided that the student meets the requirements for admission to the Graduate School, and that he is duly registered in the Graduate School at the beginning of the semester in which he intends to earn graduate credit.

2. *Transfer of Graduate Credits.* Credit for graduate course work earned at another institution will be determined only after a student has spent one semester at Duke University. After completing his first semester, the student should file a request, approved by his director of graduate studies, that his credits be reviewed and a decision be made.

3. *Graduate Credit for Courses Taken in the School of Law.* Upon the recommendation of the director of graduate studies, and upon the approval of the Dean of the Graduate School, students in the social sciences may take certain courses in the School of Law for graduate credit. In some instances courses in the School of Law may be considered as fulfilling a student's requirements for a minor. To register for such courses, the student should present a letter from his director of graduate studies to the Dean of the School of Law requesting permission to register for certain specified courses.

4. *Reciprocal Agreements with the Consolidated University of North Carolina and with North Carolina Central University.* Under a plan of cooperation between the University of North Carolina and Duke University, students regularly enrolled in the Graduate Schools of the University of North Carolina during the regular academic year, and paying full fees to that institution, may be admitted to a maximum of two courses per semester in the Graduate School of Duke University upon payment of a nominal registration fee of two dollars and of any other special fees regularly required of all students. Under the same arrangements, students in the Graduate School of Duke University may be admitted to course work at the University of North Carolina. A similar arrangement exists with North Carolina Central University.

Grades

Grades in the Graduate School are as follows: *E*, *G*, *S*, *F*, and *I*. *E* (exceptional) is the highest mark; *G* (good) and *S* (satisfactory) are the remaining passing marks; *F* (failing) is below passing; and *I* (incom-

plete) indicates that some portion of the student's work is lacking, *for an acceptable reason*, at the time the grades are reported. The instructor who gives an *I* for a course specifies the date by which the student must have made up the deficiency, in no case more than one calendar year from the date the course ended. If the course is not completed, the grade of *F* is normally entered upon the student's record. The grade of *Z* indicates satisfactory progress at the end of the first semester of a two-semester course. It will be changed to whatever grade is appropriate upon the completion of the course. A grade of *F* in a major course normally occasions withdrawal from a degree program not later than the end of the ensuing semester or term; a grade of *F* in a minor course occasions academic probation.

Courses Primarily for Undergraduates

Students granted provisional admission and others whose preparation is found deficient may on occasion be required as part of their program to take undergraduate courses as prerequisites to continued graduate study. Undergraduate courses thus taken and others elected by the student will carry no graduate credit.

In exceptional cases, 100-level courses *outside the major department* may be taken for graduate credit to a maximum of two one-semester courses or one year-course not exceeding a total of eight units, when approved by the director of graduate studies in the major department and in the department in which the course is listed and by the supervisor of the program. In order to receive credit for any such undergraduate work, the graduate student must normally earn a grade of at least *B*.

Withdrawal and Interruption of Program

From a Course. For permissible changes during the first thirty days after the registration date, see Change of Registration. If a course is dropped without the necessary approval, the permanent record will list the course as *Dropped Unofficially, F*. If a course is dropped after the thirty-day period, the status of the student at the time of withdrawal from the course will be determined and be indicated on the permanent record as *Withdrew Passing (W.P.)* or *Withdrew Failing (W.F.)*.

From the Graduate School. The University reserves the right, and matriculation by the student is a concession of this right, to request the withdrawal of any student whose academic performance at any time is not satisfactory to the University. If a student wishes for any reason to withdraw from the Graduate School, he should notify both the director of graduate studies in his major department and the Dean of the Graduate School prior to the date of his expected withdrawal. (For refunds upon withdrawal, see the section on Tuition and Fees.) For withdrawal occasioned by academic failure, see above.

Students who find it necessary to interrupt their program of study for a period longer than a summer vacation should, before departure, leave with the Graduate School Office a statement of the reason for interruption, mailing address, and expected date of return. If they are subject to registration *in absentia*, they should arrange for such registration before departure.

A foreign student who after successfully completing a minimum of one semester's graduate study must withdraw for the purpose of returning home before the completion of a graduate program may with the approval of his major department request the Dean to issue him a Certificate of Graduate Study.

Size of Classes

Classes which carry graduate credit are limited in size to thirty students. In exceptional cases this regulation may be modified, but only by permission of the Dean of the Graduate School. Courses numbered from 200 through 299 may have not only graduate students but also an unspecified number of juniors and seniors enrolled, provided the undergraduates have an over-all *B* average and the approval of both the course instructor and the director of graduate studies.

Language Requirements

Although individual departments have the right to establish their own minimal requirements (see individual departmental headnotes in this *Bulletin*), the regulations of the Graduate School demand no language for the master's degree, and a reading knowledge of one foreign language, ancient or modern, for the Ph.D. degree. The languages normally taken are French, German, and Russian. A student may substitute for any one of these another language which has a definite relation to his degree program and for which an examination can be provided. A foreign student whose native language is not English may request that the director of graduate studies in his department ask permission of the Dean of the Graduate School to offer English for the foreign language required in his program. (See Calendar at the beginning of this *Bulletin* for the scheduled dates of the appropriate examination in English.) With the special approval of the Dean and of the Executive Committee of the Graduate Faculty the foreign language requirement for the Ph.D. may be waived in individual cases or with respect to all students in a given department, provided the department submits satisfactory evidence that a foreign language has little bearing on the major program(s) of the student(s) concerned.

To avoid unnecessary delays, prospective students should anticipate the language requirement(s) of their degree programs. For example, stu-

dents whose programs call for mastery of French, German, Russian, or Spanish are urged to take the appropriate ETS Graduate School Foreign Language test prior to registration. It should be noted, however, that at the time of the final examination in a master's program or of the preliminary examination in a doctoral program, language certificates more than six calendar years old will not be accepted toward fulfilling the language requirement.

Meeting the Requirements. The foreign language requirement(s) may be satisfied in the following ways:

1. The student may take one of the Educational Testing Service examinations administered to undergraduate and graduate students at many national centers (including the Duke University Counseling Center). The examination may be taken no longer than six years before the preliminary examination.

2. With the permission of the Dean of the Graduate School and of the chairman of his program committee or of the director of graduate studies, the *doctoral* student may file a transcript or other certification as evidence of having passed a comparable examination, other than an ETS test, at another graduate institution. The limitations are that (a) only one language of a doctoral requirement may be met in this way, (b) the other institution offers a doctoral program in the student's major and the examination would have met a doctoral requirement there, and (c) the examination was passed no more than five years before first registration here.

3. In a language for which ETS tests are not available, a reading examination may be arranged by the Graduate School Office and administered by a qualified examiner.

4. In special circumstances a reading examination in any foreign language may be administered by a qualified member of the faculty under a procedure specified by a department and approved by the Dean and the Executive Committee of the Graduate Faculty.

Special Reading Courses

Special courses designed to assist graduate students in acquiring a reading knowledge of French or German are offered for three hours a week, French during the fall semester and occasionally also in the spring, German during the spring semester and the Summer Session. A student who registers for either course must reduce his normal load of graduate courses by three units, with no reduction in fees. *No auditors* are permitted in these courses at any time. Undergraduates may not enroll during the academic year but may register, with permission of the Dean of the Graduate School, in the Summer Session if total registration permits.

Undergraduate Language Courses

Students whose programs require them to take elementary language courses numbered below 200 receive no graduate credit for the work so taken. If the student wishes to demonstrate his proficiency in the language to fulfill the language requirement for his degree, he must arrange for a reading examination after securing approval from the Dean.

Requirements for Foreign Students

Foreign students whose native language is not English are, during their first registration period, required to take a test for minimum competence in English. Such students, with the approval of the director of graduate studies in their major department, may request permission of the Dean of the Graduate School to substitute English for the one foreign language required in the master's program or for one of the two in the doctoral program. If permission is granted, an additional advanced-level reading test in English will be arranged. (See Admission Procedure for Foreign Students.)

Standards of Conduct

Duke University expects and will require of all its students continuing loyal cooperation in developing and maintaining high standards of scholarship and conduct.

The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University as currently in effect or, from time to time, are put into effect by the appropriate authorities of the University.

Any student, in accepting admission, indicates his willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate, for failure to abide by such rules and regulations or for conduct adjudged unsatisfactory or detrimental to the University.

Graduate Study in the Summer Session

The Summer Session of Duke University is divided into two terms. In 1970 the first term will begin on June 9 and will end on July 15. The second term will begin on July 17 and will end on August 22.

Graduate students who wish to work toward advanced degrees in the Summer Session, particularly in chemistry, economics, education, English, history, mathematics, religion, sociology, and zoology, will find a selection of courses offered by members of the Duke faculty and by visiting professors. Other departments ordinarily offering work leading to the A.M. degree are Botany, Political Science, and Psychology. Thesis research for advanced graduate students is available also in most other departments, such as Botany, Engineering, Forestry, and Physics.

Students who wish to be admitted to the Graduate School for work in the Summer Session should make application to the Dean of the Graduate School, as well as to the Director of the Summer Session, and should return the completed application, with supporting documents, before May 12, for admission to the first term, and before June 19, for admission to the second term. (See the section on Admission.)

Regulations Regarding Summer Work

No graduate student may register for more than six units of credit in one Summer Session term. All of the work required for the master's

degree must be completed within six years of the date of matriculation. Not more than one year of residence credit can be accepted toward the requirement for the Ph.D. and Ed.D. degrees for work completed during Summer Sessions. (See page 1 for a definition of a year's residence credit earned in Summer Sessions.) Students who complete in a Summer Session the work required by the University for the master's degree will be granted the degree in September.

A *Bulletin of the Summer Session* containing information about graduate courses may be obtained by writing to the Director of the Summer Session, Duke University, Durham, N. C.

Courses of Instruction

In general, courses with odd numbers are offered in the fall semester, those with even numbers in the spring semester. Double numbers separated by a hyphen indicate that the course is a year course and must normally be continued throughout the year if credit is to be received. A student must secure written permission from the instructor in order to receive credit for either semester of a year course. Double numbers separated by a comma indicate that although the course is a year course, credit may be received for either semester without special permission. Normally, courses which bear no date are offered every year.

Note: In each department the number 399 is reserved to designate special (individual) readings in a specified area and supervised by a regular member of the graduate staff, with credit of one to three units each registration, only one course per registration, and nine units maximum in three successive registrations. The course is restricted to resident master's and doctoral programs, must have a completion exercise, and must carry a grade.

Anatomy

Professor Robertson, *Chairman* (401 Davison Building); Professor Buettner-Janusch, *Director of Graduate Studies* (Old Hospital Laundry); Professors Everett, Markee, Moses, and Peele; Associate Professors Duke, Longley, and Reedy; Assistant Professors Counce, Mahaley, Shafland

The Department of Anatomy offers graduate courses and training leading to the A.M. and Ph.D. degrees. Further information may be obtained from the Director of Graduate Studies.

203. *Anatomy of the Nervous System*. A study of the gross and microscopic structure of the human central nervous system, special attention being paid to the structural and functional relationships between the various nuclei and fiber tracts. Minimum registration, eight students. Prerequisite: Gross Anatomy. Hours and credits (maximum 3 units) by arrangement. *Peele*

204. *Neuroanatomical Basis of Behavior*. A study of the gross and microscopic anatomy of the nervous system with emphasis on the structural and functional relationship between tracts, nuclei, and cortical areas. Restricted to graduate students with the equivalent of a major in psychology. (Sept.-Jan.) 3 units. *Peele*

206. *Anatomy of the Back and Extremities*. Complete dissection is performed of that part of the body concerned with locomotion and posture. This course is designed for Ph.D. candidates in anatomy, as well as students interested in general practice, orthopaedics, or neurosurgery. Prerequisite: core course in anatomy or equivalent. Number of students arranged by staff. 2 units. *Duke and Markee*

208. *Anatomy of the Trunk*. This course is designed for Ph.D. candidates in anatomy as well as for future general practitioners and specialists in surgery and internal medicine. Emphasis upon the anatomy of the thoracic, abdominal, and pelvic organs. Prerequisite: core course in anatomy. Number of students arranged by staff. 2 units. *Duke and Markee*

216. *Anatomy of the Head*. This course is designed for Ph.D. candidates in anatomy as well as general practitioners, neurosurgeons, clinical neurologists, ophthalmologists, and otolaryngologists. The major emphasis will be on gross dissections. Prerequisite: core course in anatomy or the equivalent. Number of students arranged by staff. 2 units. *Duke, Everett, and Markee*

220. *Dissection of Restricted Regions*. This is planned for the individual needs and special interests of the students requesting it. For example, the subject may be the heart and its anatomical characteristics and relationships. Prerequisite: core course in anatomy or equivalent. 1 to 3 units. *Duke and Markee*

230. *Advanced Neuroanatomy of Motor Mechanisms*. The course will involve consideration of classic and modern concepts of organization of somatic and visceral motor systems. Pyramidal, extra-pyramidal (including cerebellar), and limbic-hypothalamic neural mechanisms will be stressed. Prerequisite: core course in neuroanatomy or equivalent. 2 units. *Peele*

231. *Physical Anthropology*. A survey of the major developments of physical anthropology. Human evolution, primate phylogeny, paleon-

tology of man and other primates, primate biochemical genetics, primate behavior, and human variation (genetic and somatic) are the principal topics of the course. Prerequisite: general biology, genetics. (Listed also as Anthropology 231.) 3 units. *Buettner-Janusch*

232. *Human Genetics*. Particular emphasis upon the uniqueness of studies in human genetics, human biochemical genetics, human population genetics. Prerequisites: Anatomy 231, Zoology 131 (or an elementary course in biology including genetics), or permission of instructor. (Listed also as Zoology 232 and Genetics 232.) 3 units. *Buettner-Janusch*

236. *Advanced Neuroanatomy of Sensory Mechanisms*. The course will involve consideration of classic and modern concepts of organization of somatic and special sensory systems. Thalamic and thalamocortical interrelations will be emphasized. Prerequisite: core course in neuroanatomy or equivalent. 2 units. *Peele*

244. *Topics in Cell Structure and Function*. Advanced discussions of selected problems such as chromosome structure, mitosis, and cytological aspects of inheritance and development. Prerequisite: Zoology 243 (Botany 243) or equivalent and permission of instructor. (Listed also as Zoology 244.) 2 units. *Moses (Anatomy) and Nicklas (Zoology)*

261. *History of Generation and Mammalian Reproduction*. Fall 1969-70 and alternate years thereafter. (Alternates with Anatomy 263.) 1 unit. *Duke*

263. *History of Anatomy*. Fall 1970-71 and alternate years thereafter. (Alternates with Anatomy 261.) 1 unit. *Duke*

264. *Mammalian Embryology and Developmental Anatomy*. 4 units. *Duke*

288. *The Cell in Development and Heredity*. A seminar on topics of current interest and controversy. (Alternating with Anatomy-Zoology 244.) Prerequisites: a course in genetics and permission of one instructor. Spring 1971 and alternate years thereafter. (Also listed as Zoology 288.) 2 units. *Counce (Anatomy), Gillham (Zoology), and Staff*

301. *Gross Human Anatomy*. Complete dissection of the cadaver. Laboratory work is supplemented by conferences which place emphasis on the biological aspects of the subject. Prerequisite: adequate training in comparative anatomy and embryology. Hours and credits (maximum 8 units) by arrangement. *Duke, Everett, Markee, Shafland, and Staff*

312. *Research*. Individual investigations in the various fields of anatomy. Credits to be arranged. *Staff*

313-314. *Anatomy Seminar*. Regular meeting of graduate students and staff in which current research problems in anatomy will be presented. Required of all graduate students who are candidates for the A.M. or Ph.D. degree. 2 units. *Staff*

331-332. *Primate Seminar*. Detailed examination of the literature on the primates. Systematics, genetics, behavior, field studies, morphology,

and paleontology are the major topics. Museum and live specimens will be examined at the Primate Facility. 1969-70 and alternate years thereafter. (Alternates with Anatomy 333-334.) Prerequisite: consent of instructor. 3 units each semester. *Buettner-Janusch and Staff*

333-334. *Physical Anthropology Seminar*. An examination of the principal theories and research areas in physical anthropology. Emphasis on evolutionary and phylogenetic theory; population and biochemical genetics; ethological approach to primate evolution. Offered initially 1970-71 and alternate years thereafter. (Alternates with Anatomy 331-332.) 3 units each semester. Prerequisite: consent of instructor. *Buettner-Janusch and Staff*

340. *Tutorial in Advanced Anatomy*. Selected topics will be chosen related to basic problems of biophysics, cytology, endocrinological control, growth and development, neuroanatomy, physical differentiation, and evolutionary origins of functional micro-systems. 3 units. *Staff*

354. *Research Techniques in Anatomy*. A preceptorial course in various research methods in anatomy. An interested student might engage in research in anthropology, electron microscopy, developmental biology, fetal physiology, primate behavior, primate anatomy, and stereotactic approaches to neuroendocrinology and neuroanatomy. Approval by faculty required. Units to be arranged. *Staff*

374. *Gross Anatomy of the Cardiovascular System*. Highly individualized course, consists mainly of dissection of lungs, heart, and great vessels. Visual aids and self-learning devices will be used extensively. Prerequisite: core course in anatomy or equivalent. 2 units. *Markee*

382. *Topics in Developmental Biology*. A review of recent advances in developmental biology. Emphasis upon events at the cellular level during morphogenesis and cell differentiation. Prerequisite: a course in embryology or permission of the instructor. 3 units. *Counce*

384. *Tutorial in Developmental Biology*. Reading and discussion program arranged to suit the individual student's interests in the field. Prerequisite: permission of instructor. Maximum registration, five students. 2 units. *Counce*

386. *Optical Methods in Biophysical Cytology*. Theory and application of biophysical techniques for investigating cell structure and function: fundamentals of optics; qualitative and quantitative analysis using ordinary, ultraviolet, phase, interference, polarization, and fluorescent microscopy and transmission and scanning electron microscopy; optical, electron, and X-ray diffraction; autoradiography. Prerequisites: microscopic anatomy or cytology (or equivalent), calculus and one year each of physics and general chemistry; permission of instructor. Given spring, 1970, and alternate years thereafter. (Alternates with Anatomy 388.) 4 units. *Longley, Moses, Reedy, and Robertson*

388. *Molecular Basis of Anatomy*. Lectures and conferences on the molecular structure of biological macromolecules and their organized ag-

gregates such as are found in viruses, muscles, membranes, and other intracellular organelles, with emphasis on the results of electron microscopy, X-ray diffraction, and optical analysis. Prerequisites: microscopic anatomy or cytology (or equivalent) and permission of instructor. Given spring, 1971, and alternate years thereafter. (Alternates with Anatomy 386.) 3 units. *Longley, Moses, Reedy, and Robertson*

Art

Professor Heckscher, *Chairman*; Professors Hall, Markman, and Patrick; Adjunct Professor Bier; Associate Professor Sunderland; Lecturer Meyvaert

A graduate program is in preparation; however, the following courses are suggested as possible minors for students majoring in anthropology, history, literature, philosophy, religion, psychology, or sociology, or for students in any other department.

217. *Aegean Art*. A study of the problems of Aegean art as the forerunner of Greek art and in relation to the contemporary civilization of the eastern Mediterranean world. 2 units. *Markman*

218. *Early Greek Art*. A study of the problems of the origin and development of Greek art in the Geometric period to the end of the Archaic. 3 units. *Markman*

221-222. *History of Aesthetics*. Theories of art and beauty in the Western world from antiquity to the present. Some attention will be given to the developed theories of aesthetics in the Far East. 6 units. *Patrick*

*233. *Early Mediaeval Architecture*. The development of religious architecture from the time of Constantine to the end of the First Romanesque style in the third quarter of the eleventh century. 3 units. *Sunderland*

*234. *Romanesque Sculpture*. The development of sculpture in Western Europe from the early Christian period through the culmination of Romanesque art in the west portal of Chartres Cathedral. 3 units. *Sunderland*

239. *Architecture of Britain*. A summary of recent archaeological activity in the British Isles and a survey of mediaeval building, the course deals principally with changing architectural problems and their solutions from the advent of the Renaissance onward. Attention is given to the interests of students majoring in history or literature. 3 units. *Hall*

240. *Architecture of North America*. A study illustrating the transplantation of European architectural customs since the sixteenth century; the time-lag in transit and acceptance of later European developments;

*Offered on demand.

the gradual assumption of confident independence in design; and the emergence of international leaders in the United States. 3 units. *Hall*

241. *Latin American Art*. The architecture, painting, sculpture, and other arts. Emphasis on the architecture of the colonial period. Open to seniors who have a reading knowledge of Spanish and/or have had courses in Latin American history, economics, or literature. 3 units. *Markman*

243. *The Art of the Illuminated Manuscript*. The art of the book in the British Isles in the early Middle Ages. A seminar course dealing with palaeographic and art historical aspects of illuminated manuscripts. 3 units. *Meyvaert*

251, 252. *Research*. A course designed to give instruction in methods used in the investigation of original problems. Open to seniors by permission of the Director of Undergraduate Studies. 6 units. *Heckscher*

*292. *Research Problems in the Collections of the North Carolina Museum of Art*. Students will meet once every week in the museum in Raleigh. Each student will submit a report on his particular research project. 3 units. *Bier*

Asian Languages

The course is offered as an enrichment for students interested in the South Asian subcontinent and may be taken as a general elective by advanced undergraduate students. No major work is offered in Hindi-Urdu.

Hindi-Urdu 200-201. *Special Studies in South Asian Languages*. Intensive concentration in advanced Hindi reading and conversation, or specialized graded work in cognate South Asian languages necessary for the advanced student contemplating field work in South Asia. Prerequisite: consent of instructor. 6 units. *Staff*

For offerings in Chinese and Japanese, see *Bulletin of Undergraduate Instruction*.

Biochemistry

Professor Hill, *Chairman* (Medical Sciences Building); Professor Gross, *Director of the Genetics Division* (Medical Sciences Building); Professor McCarty, *Director of Graduate Studies* (Medical Sciences Building); Professors Bernheim, Guild, Handler‡, Kamin, Tanford, and Wakil; Associate Professors Appel, Fridovich, Harris, Kaufman, Kirshner, and Lynn; Assistant Professors Greene, Hall, Harriman, Joshi, Kelley, Rajago-

*Offered on demand.

‡On leave of absence.

palan, Richardson, Sage, Siegel, Turkington, and Wheat; Associates Habig, Nozaki, and Reynolds

Graduate work in the Department of Biochemistry is offered leading to the Ph.D. degree. Preparation for such graduate study may take diverse forms. Undergraduate majors in chemistry, biology, mathematics, or physics are welcomed, but adequate preparation in chemistry is essential. Graduate specialization areas include protein structure and synthesis, enzyme action, and metabolism. The Division of Genetics of the department, in cooperation with the University Program in Genetics (see page 129) offers biochemistry students the opportunity to pursue advanced research and study to fulfill the requirements for the Ph.D. degree.

For Seniors and Graduates

†203. *Chemistry of Natural Products*. Emphasis on the organic chemistry of carbohydrates, lipids, and steroids. Aspects of stereochemistry conformational analysis and physical methods of structural investigation will be discussed. Prerequisite: one year of organic chemistry; one semester of physical chemistry also recommended. 2 units. *Kaufman*

204. *Introductory Genetics*. An introduction to genetic analysis with emphasis on the molecular basis of mutation, segregation, function, and organization of the genetic material. Primarily for medical students, but graduate students may be admitted with the instructor's permission. (Listed also as Genetics 204.) 3 units. *Gross and others of the University Program in Genetics*

S 208. *Laboratory Methods in Biochemistry*. An advanced laboratory course that emphasizes current procedures, instrumentation, and experiments. Each student selects from a number of experiments of a wide range of classical investigations that illustrate significant biochemical progress. Prerequisites: Biochemistry 203, 303, and 308, or equivalent. 2 units. *Joshi*

M 241. *General Biochemistry*. An introductory survey of fundamental aspects of biochemistry with emphasis on the structure of macromolecules, mechanism of enzyme action, metabolic pathways, biochemical genetics, and the structure and functions of special tissues. Intended primarily for medical students, but available also for graduate students who cannot register for Biochemistry 248 in the spring semester. 4 units. *Hill and Staff*

247. *Introductory Biochemistry*. The chemistry of proteins, lipids, carbohydrates, and nucleic acids and the metabolic interrelationships of these compounds. The biochemical basis of photosynthesis, genetics, vision, nutrition, nerve conduction, and muscle contraction will also be considered. Prerequisites: Chemistry 151, one year of college physics (second semester may be concurrent), Mathematics 22, or consent of the

†Not offered in 1970-71.

instructors. This course is acceptable in partial fulfillment of the departmental major requirements in biochemistry, botany, chemistry, and zoology. (Listed also as Zoology 248.) 3 units. *Tanford and Rajagopalan*

251. *Biochemistry of Development*. Current concepts on control mechanisms in embryonic development and differentiation discussed at the cellular, biochemical, and molecular level. 2 units. *McCarty, Harris, Joklik, and Turkington*

†282. *Experimental Genetics*. A series of laboratory exercises and discussions on the molecular mechanisms of mutation, recombination, replication, transcription, and translation of the genetic material. May be taken concurrently with Genetics 280. Prerequisite: consent of instructor. (Also listed as Genetics 282.) 2 units. *Hall, Harriman, and others of the University Program in Genetics*

For Graduates

303. *Macromolecules*. The structures of biological macromolecules and their relations to biological functions. The emphasis is on proteins and enzymes. Prerequisites: physical chemistry equivalent to Chemistry 161-162. 4 units. *Tanford and Hill*

307. *Enzyme Mechanisms*. A review of techniques for the purification of enzymes, thermodynamic aspects of enzyme catalysis, parameters of the activation process, and over-all reactions. Model reactions are used to gain insight into the mechanisms of enzymic reactions. The number and affinities of binding sites and the identification of the residues involved in the activation of enzymes will also be considered. 3 units. *Fridovich and Rajagopalan*

308. *Metabolism*. A lecture and conference course on the chemical transformations of biological compounds, emphasizing energy productions and utilization, the mechanisms of the enzymes involved, and the control of metabolic pathways. Prerequisites: Biochemistry 248 and 303, or by permission of the instructors. 3 units. *Kamin and Staff*

310. *Nucleic Acids and Macromolecular Synthesis*. Physical properties of nucleic acids in terms of covalent structure, helix, base pairing, helix-coil transitions, as well as properties that influence fractionation by techniques of column-fractionation, velocity, and equilibrium centrifugation are considered in relation to biological function. Protein-nucleic acid interactions, as well as damage, repair, and mechanisms of synthesis will be reviewed. Mechanisms of RNA transcription and enzymatic alterations of preformed macromolecular structures will be illustrated by recent examples. Protein synthesis and polypeptide bond formation is considered in terms of initiation, decoding, translocation, ribosomes, termination, and release. 3 units. *McCarty and Guild*

316. *Molecular Genetics*. An advanced course on genetic mechanisms

†Not offered in 1970-71.

and their relationship to nucleic acids. Prerequisites: introductory courses in biochemistry and genetics. (Listed also as Genetics 315.) 3 units. *Guild and others of the University Program in Genetics*

345-346. *Biochemistry Seminar*. Required of all graduate students majoring in biochemistry. 1 unit each semester. *Sage*

347. *Special Topics*. Current topics in biological oxidations. A lecture, conference, and seminar course which deals with the mechanism of electron transport and energy conservation in a variety of oxidative enzymes. These mechanisms will be examined both in purified enzymes and in organized systems such as the mitochondrion, the endoplasmic reticulum, and the chloroplast. 2 units. *Kamin, Fridovich, Rajagopalan, and Lynn*

348. *Special Topics*. Current topics in immunochemistry. The structure, function, and specificity of antibodies. Immunogenicity and tolerance with special emphasis on current theories of the diversity and synthesis of antibody molecules. (Listed also as Microbiology 348.) 2 units. *Sage and Day*

351-352. *Genetics Seminar*. Required of all students specializing in genetics. (Listed also as Genetics 351-352.) 1 unit each semester. *Gross and others of the University Program in Genetics*

M 354. *Biochemistry of Disease*. Designed for the third or fourth year medical student who is interested in the primary defect, manifestations, and diagnostic aspects of diseases of metabolic or genetic origin. Emphasis on defects in diabetes mellitus and other endocrine disorders, disturbances of electrolyte metabolism, and genetic lipidoses. First and second terms. Maximum registration, forty students. 2 units. *Hill and Staff*

371. *Animal Cell Biology*. An introduction to morphology, fractionation, characterization, and synthesis of cellular organelles (chromosomes, membranes, ribosomes, nucleoli, and lysosomes). The use of tissue culture systems for studying cellular functions, synthesis of nucleohistones, the mitotic cycle. (Listed also as Microbiology 371.) 2 units. *Joklik, McCarty, and others*

384. *Current Topics in Genetic Mechanisms*. A seminar and lecture course devoted to the analysis of the current literature in molecular genetics. Given in response to adequate demand. Prerequisites: Genetics 280 or its equivalent and consent of the instructor. (Also listed as Genetics 384.) 1 unit. *Hall and others of the University Program in Genetics*

395-396. *Biochemical Pharmacology I & II*. The courses will emphasize mechanism of action of drugs in the areas of (1) metabolism and toxicology; (2) antibiotics; (3) steroids; (4) antimetabolites and oncolytic agents; (5) embryology and development; (6) hematopoietic system and porphyrins; (7) lipids and carbohydrates; (8) membrane structure and function; and (9) ground substance (mesenchyme). The lectures will

correlate the material in terms of clinical significance. 2 units. *Bressler, Brendel, Lack, Palmer, Posner, Elford, Kirshner, and Kamin*

Botany

Professor Johnson, *Chairman* (354 Biological Sciences Building); Professors Anderson, Billings, Hellmers, Kramer, Naylor, Perry, and Philpott; Associate Professors Culberson, Searles, Stone, Strain, White, and Wilbur, *Director of Graduate Studies* (265 Biological Sciences Building); Assistant Professor Boynton

Graduate work in the Department of Botany is offered leading to the A.M. and Ph.D. degrees. Before undertaking graduate study in botany a student should have had in his undergraduate program at least 12 semester hours of botany beyond an elementary course, and related work in biological sciences. Some work in chemistry and physics will be desirable and, for some phases of botanical study, a necessity. Graduate Record Examination scores are required of all applicants. The student's graduate program is planned to provide a broad basic training in the various fields of botany, plus intensive specialization in the field of the research problem.

205. *Anatomy*. Intensive survey of vascular plant cell types, tissues, and organs, with emphasis on the modern application of anatomy to problems of systematics and phylogeny. Laboratories will include micro-technique. Special project and term paper stressing current techniques and literature required. Prerequisite: permission of instructor. 4 units. *White*

209. *Lichenology*. The morphology, systematics, and biological and ecological implications of the lichens. Collection and identification of specimens and the use of lichen chemistry in taxonomy. Prerequisite: two semesters of botany. 3 units. *Culberson*

†210. *Bryology*. The morphological, systematic, and ecological characteristics of mosses and liverworts. 3 units. *Anderson*

212. *Phycology*. Morphological and ecological characteristics of common freshwater and marine algae and principles of their classification. 4 units. *Searles*

221. *Mycology*. Field and laboratory study of the vegetative and reproductive structures of the fungi and slime molds. Methods of collection, isolation, propagation, and identification of the major orders as represented in the local flora. Prerequisite: one year of biological science. 4 units. *Johnson*

225-226. *Special Problems*. Students with adequate training may do special work in the following: (1) mycology and plant pathology, (2)

†Not offered in 1970-71.

cytology, (3) ecology, (4) genetics, (5) morphology and anatomy of higher groups, (6) morphology and taxonomy of lower groups, (7) physiology, (8) taxonomy of higher groups, (9) microbiology, (10) experimental taxonomy in evolution, (11) phycology. Credits to be arranged. *All Members of the Graduate Staff*

†240. *Evolution*. Analysis of the processes of adaptation and evolution in individuals, populations, and genetic systems. Prerequisites: introductory biology and genetics, or consent of instructors; cytology recommended. 3 units. *Stone and Klopfer*

†242. *Systematics*. A general survey of the principles of vascular plant taxonomy, with practice in identification and collection. Special project or term paper required. Lectures, laboratories, and field trips. Prerequisite: permission of instructor. 4 units. *Wilbur*

243. *Cytology*. The structure and functional organization of cells. Lectures, readings, and conferences. Prerequisite: one year of botany or zoology. (Listed also as Zoology 243.) 3 units. *Anderson and Nicklas*

245. *Plant Diversity*. An examination of the major groups of the living plants and a consideration of their evolutionary origins and phylogenetic relationships. Prerequisite: one year of biology. 4 units. *Culbertson*

246. *Ecology*. Intensive study of the environmental effects on growth and distribution of plants at the level of the individual, the population, and the ecosystem. A term paper will be required. Lectures, laboratories, and field trips. Prerequisite: permission of instructor. 4 units. *Billings*

250. *Plant Biosystematics*. Application of the basic descriptive and experimental fields to problems of vascular plant evolution. Emphasis on laboratory studies, including preparation of materials, analysis of data, and correlation with current literature. Prerequisites: Botany 52 and 55 and either Botany 243 or a course in genetics, or their equivalents. 3 units. *Stone and White*

251. *Physiology*. A general survey of the major physiological processes in plants, including food syntheses, growth, and water relations. Lectures, laboratories, and readings. Prerequisite: permission of instructor. (Also listed as Forestry 201.) 3 units. *Hellmers*

252. *Plant Metabolism*. The physiochemical processes and conditions underlying the physiological processes of plants. Prerequisite: Botany 151 or equivalent; organic chemistry recommended. 4 units. *Naylor*

254. *Plant-Water Relations*. A study of factors affecting the availability of water, its absorption and use in plants, and the effects of water deficits on plant processes. Assigned readings, reports, and lectures. Prerequisite: Botany 151 or equivalent. 3 units. *Kramer*

†255. *Plant Systematics*. A study of the historical background of plant taxonomy, modern concepts and systems of classifications, nomenclatorial

†Not offered in 1970-71.

problems, and the taxonomy of specialized groups. Prerequisite: Botany 52 or equivalent. 4 units. *Wilbur*

†257. *Principles of Plant Distribution*. Interpretation of floristic and ecological plant geography of world vegetation. Prerequisite: Botany 156 or equivalent. 3 units. *Billings*

258. *Physiology of Growth and Development*. Consideration of the internal factors and processes leading to the production of new protoplasm and its differentiation at the cellular, tissue, and organ level in plants. Prerequisites: Botany 151 or equivalent; organic chemistry recommended. 4 units. *Naylor*

259. *The Environment*. Environmental principles and methods of obtaining and evaluating environmental data for ecological purposes with special attention to instrumentation and microclimate. Prerequisite: Botany 156 or equivalent. 3 units. *Billings*

265. *Physiological Plant Ecology*. A consideration of the physiological approach to interpreting adaptation in plants. Special but not exclusive attention will be given to terrestrial seed plants. Prerequisites: Botany 151 and Botany 156 or equivalents. 4 units. *Strain*

266. *Analysis and Classification of Vegetation*. A study of the concepts and methods of synecology. Historical aspects will be reviewed but emphasis will be placed on modern approaches to the analysis and classification of vegetation. Prerequisite: Botany 156 or equivalent. 4 units. *Strain*

280. *Principles of Genetics*. Introduction to the structure and properties of genes and chromosomes and to the evolution of genetic systems. Prerequisites: introductory courses in biology, chemistry, and mathematics or equivalent. (Also listed as Botany 180, Zoology 180, and Zoology 280.) 3 units. *Boynton, Gillham and others of the University Program in Genetics*

359-360. *Research in Botany*. Individual investigation in the various fields of botany. Credits to be arranged. *All Members of the Graduate Staff*

383. *Current Topics in Developmental Genetics and Cytogenetics*. A seminar and lecture course devoted to the analysis of the current literature in developmental and cytogenetics. Given in response to adequate demand. Prerequisites: Botany 280 or its equivalent and consent of the instructor. 1 unit. *Boynton and others of the University Program in Genetics*

Marine Laboratory

Four marine botany courses are given in the Duke University Marine Laboratory, Beaufort, N. C.; S205, Marine Microbiology; S207, Marine Mycology; S211, Marine Phycology; S220, Coastal Field Botany.

†Not offered in 1970-71.

The University Program in Genetics

Genetics courses offered by the Botany Department are an integral part of this interdepartmental program. Refer to the announcement in this *Bulletin* under the University Program in Genetics for description of the other offerings which include: 282, Experimental Genetics; 315, Molecular Genetics; 351-352, Genetics Seminar; 384, Current Topics in Genetic Mechanisms; 385, Current Topics in Population Genetics and Evolution.

Business Administration

Professors Keller and Volpp; Associate Professors Baligh, Dellinger, and Pondy

The Graduate School of Business Administration offers work leading to both the M.B.A. and Ph.D. degrees. The M.B.A. program is designed for students whose undergraduate work included at least one year of calculus and an educational background adequate for rigorous analysis. Normally, undergraduate majors in such fields as the physical and biological sciences, mathematics, engineering, and the social sciences are well suited for the program. The M.B.A. program is designed to provide a thorough foundation in the concepts and theory that underlie the design, operation, and control of modern complex organizations.

The Ph.D. program is designed for students who desire to enter either the academic profession or advanced and specialized administrative research positions. The doctoral level course work presumes either a Duke M.B.A. or the equivalent.

Master of Business Administration

First Year Courses (Required)

B.Ad. 300-301. *Managerial Theory of the Firm*. Classical economic theory and its further developments into more advanced, modern, and useful forms as elements of the fundamental theory of the firm are the subjects of this course. Major emphasis is on the theory of competitive price and non-price market behavior in single and multiple market segments, inventory and production planning, capital investment decisions introductory concepts of cooperation for exchange (i.e., vertical production and marketing relationships), and formulation of the basic economic strategy of the firm. 5 units semester I and 4 units semester II.

B.Ad. 310-311. *Foundations for Quantitative Analysis*. The mathe-

mathematical and statistical background, beyond the level of differential and integral calculus required in the M.B.A. program is provided in this course. The major topics included in the first semester are: sets, relations, and functions; matrix algebra; classical optimization techniques; and linear programming. In the second semester, the topics included are: probability, statistical decision theory, sampling theory, estimation and hypothesis testing, and regression and correlation analysis. 5 units semester I and 4 units semester II.

B.Adm. 320-321. *Management of Information and Control Systems.* The problems of information system design, data collection, and analysis for purposes of planning, evaluating, controlling, and revising the plans of the firm form the core of this course. The accounting and more general information systems considered and developed are closely related to the marketing, production, and financial decisions treated in B.Adm. 300-301. Motivation through proper use of the reporting and information system is explored in detail. 2 units semester I and 4 units semester II.

B.Adm. 330-331. *Organization Theory and Management.* The first semester of this course is concerned with the analysis of purposive behavior in complex organizations. Theories of individual decision-making, human aspects of groups, and normative and descriptive systems are the major areas of concern. The second semester continues the work but emphasizes the firm as a social-political system. Strategy concepts, motives for collective activity, goal setting, and policy formulation are the primary topics. The course ends with an overview of the executive function within the administrative system. The purpose of the course is to provide the future administrator with an understanding of human behavior in groups and formal organizations, particularly as that behavior deviates from and extends B.Adm. 300-301. In addition, the course provides the behavioral theories and findings necessary for treating the firm as an information-processing, problem-solving system in B.Adm. 320-321. 4 units semester I and 2 units semester II.

B.Adm. 341. *Macroeconomic Analysis.* The economic theory pertaining to the economy of the nation is developed in this course. The determinants of price level, rate of growth, and level of aggregate income, employment, and output are studied with emphasis on understanding the rationale of government policies and the impact of governmental behavior on these variables. 2 units semester II.

Second Year Courses—Fall Semester (Required)

The purpose of the work in the third semester of the M.B.A. program is to provide advanced tools of analysis and a general framework of understanding within which those tools can be applied. The relation-

ships among the parts of the firm and the relationships between the firm and the various sectors of its environment can be classified into those which are competitive and those which are cooperative. (Obviously, the relationships between any two organizations are likely to contain both competitive and cooperative aspects.) The work in this semester is focused on more advanced analysis of how the firm's internal relationships and actions are related to the firm's external relations and actions. Since the legal framework is closely related to these matters, an introduction to some aspects of the law is included. Prerequisites for this set of courses are the courses in the first-year M.B.A. program.

B.Ad. 312. *Operations Research*. Mathematical models of various aspects of economic operations are developed and solved, including topics in the areas of queuing, inventory, and maintenance. General procedures for the solution of mathematical problems involving the identification of maxima and minima are studied along with simulation and the use of the computer for the generation of solutions. 4 units.

B.Ad. 302. *Cooperative Decisions and Competitive Strategies*. The course deals with the problems of choosing cooperative economic relations in order to effect exchange transactions, and the problems of determining competitive behavior. The efficiency and stability of various forms of cooperative vertical market structures under simple competitive conditions are rigorously studied. Competitive market decisions are studied in the context of the formulation and solution of purely competitive market games.

Although the more advanced and rigorous portions of the course are mathematical and theoretical, increasing emphasis is focused on the practical applications to markets and the development of realistic combinations of cooperative and competitive programs. 4 units.

B.Ad. 303. *Cooperative-Competitive Relations and Decisions*. The firm's decisions on its cooperative and competitive behavior, and on the design of its internal structure and its production and financial operations are treated simultaneously in the models of this course. The subject of the course is the firm's coordinated treatment of the decision variables which reflect its direct relations to those economic units with which it cooperates and competes to effect exchange transactions, and those which relate to the form of its internal operations and organizational structures. 2 units.

B.Ad. 332. *Organization Design and Internal Operations*. The design of organizations for coordination and control of the internal operation is studied. The topics include: (a) specialization, both functional and hierarchical, with particular attention to the problems of decomposition and decentralization; (b) coordination, including benefit/cost analyses of alternative means of coordination; and (c) control, with emphasis on the role of information systems and the design of decision rules. These

topics are examined for the organization in general, but with specific reference and application to the production and finance segments. 4 units.

B.Adm. 349. *Law as a Constraint for Business*. The major laws that specify the rules within which the firm must operate, including some aspects of the commercial code, anti-trust law, labor and fair employment law, the most significant regulatory agencies, and court cases that assist in understanding the application and interpretation of the law are studied. 2 units.

Second Year Courses—Spring Semester

This final semester of the M.B.A. program is oriented to bring to application the foundations built during the first three semesters. Hence, the bulk of the work in this semester is directed toward understanding and solving problems of the firm, using the tools of analysis and the conceptual framework developed earlier. The only specifically required courses are B.Adm. 350 and B.Adm. 390.

B.Adm. 350. *Public Policy of the Firm*. This course is focused on analysis of the relationships between the firm and the three segments of society: the public at large, the organizations and individuals in close contact with the firm, and the members, or employees, of the firm. Primary emphasis of the other parts of the M.B.A. program is on design and decision-oriented to reach the goals of the firm. This course treats some of the problems involved in selecting the ends and restraints from among feasible alternatives: i.e., the problems of developing a policy of the firm toward the society of which it is a part. 3 units.

B.Adm. 390. *Practicum*. The practicum is individually designed. Each student is required to engage in the practical solution of one or more problems of an economic enterprise. The project selected must be closely related to one of the elective courses selected by the student. Each of the electives is oriented toward the solution of practical problems, and the practicum is intended to provide some experience in designing and implementing a plan or solution and, in so doing, to provide some experience in independent study focused on the development of a useful plan or solution. 4 units.

B.Adm. 351. *Finance*. The management of the financial affairs of the firm in its attempt to develop an optimal capital structure includes the sale of corporate securities of all varieties and the related knowledge about the requirements of investors at particular points in time, and the translation of plans and programs into needs which must in turn be met by cash resources from either internal or external sources. 4 units.

B.Adm. 353. *Marketing*. An application of the general theories previously studied to the firm's marketing problems. Definition and resolution of these problems involves a more detailed discussion of the existing market environment of the firm. Problems studied are those of con-

sumer behavior, marketing structures, product planning, pricing, promotion, logistics, and marketing research. 4 units.

B.Ad. 355. *Production*. The purpose is to give the student experience in applying the theories developed during the first three semesters to problems of professional practice in the area of production management. Two major problem areas are covered: the design (or planning) of manufacturing systems and their operation (or control). Sub-topics under design include plant layout economic evaluation of materials, methods, and processes and facilities planning. Sub-topics under operation include cost, inventory, and quality control, short-run scheduling and capacity utilization, maintenance, start-up problems, and equipment replacement. 4 units.

B.Ad. 313. *Advanced Operations Research*. Emphasis on application of dynamic and stochastic models and less to static and deterministic models and on the strategic design and control of more complex, multi-unit activities leads to formulation of operations research models and modification of existing models for new and novel problem situations. 4 units.

B.Ad. 323. *Controllorship*. The focus of this course is on developing systems for collecting and summarizing data in a manner which meets the requirements of the management team in its function of controlling and planning operations of the firm. The function of the controller, as the center for synthesis and analysis of data, is studied in the context of the foundations established during the first three semesters of the program. 4 units.

B.Ad. 324. *External Reporting and Auditing*. This course builds on the information systems sequence of the first year and the public policy course, B.Ad. 350, in terms of developing requirements of the system for reporting to parties, external to the firm, who have need for information about the activities of the enterprise for decision-making purposes. Communication and measurement problems as well as the role of the independent auditor in developing evidence of an attesting to the reliability of data will be studied in detail. 4 units.

B.Ad. 333. *Manpower Planning and Management*. Application of behavioral and economic theories and of quantitative techniques to management of the firm's human resources, including treatment of both labor and management personnel, form the primary subject matter of this course. Detailed examination of American occupational structure (e.g., mobility patterns, increasing specialization, and professionalization) and analysis of the labor union as an institution are included. Topics studied within the constraints of occupational structure and educational and labor institutions are: employee testing, selection, and assignment training and development; performance evaluation and optimal incentive systems; and strategic and tactical factors in collective bargaining. 4 units.

Doctor of Philosophy

One year of study (30 semester hours) beyond completion of the Duke M.B.A. degree or its equivalent is planned for each doctoral candidate. The year of study should include two courses in advanced economic theory, two courses in mathematics or statistics, one course in philosophy of science, and three courses in an elected field of administration. The latter are individually designed and are offered on a tutorial basis to provide extensive reading in the historical and current literature, and a demanding research program.

The requirements of the Graduate School (see page 12) are applicable to students in the Ph.D. program in business administration.

Chemistry

Professor Bradsher, *Chairman* (101 Gross Chemical Laboratory); Professor Quin, *Director of Graduate Studies* (376 Gross Chemical Laboratory); Professors Brown, Hobbs, Krigbaum, Poirier, Strobel, and Wilder; Associate Professors Chesnut, Jeffs, McPhail, Smith, Toren, and Wells; Assistant Professors Henkens, Lochmüller, Palmer, and Porter; Adjunct Professor Peterlin; Adjunct Associate Professors Pitt, Rosenthal and Schindler

In the Department of Chemistry graduate work is offered leading to the A.M. and Ph.D. degrees. Before undertaking a graduate program in chemistry, a student should have taken an undergraduate major in chemistry, along with related work in mathematics and physics.

Graduate courses in the department are offered in the fields of inorganic, analytical, organic, and physical chemistry. Research programs are active in all of these fields.

A booklet providing detailed information on the department is available from the Director of Graduate Studies.

For Seniors and Graduates

216. *Nuclear Chemistry*. Elementary theory of nuclear reactions, properties of isotopes, and tracer techniques. Two lectures and three laboratory hours. Prerequisites: introductory physics and analytical and organic chemistry. 3 units. *Lochmüller*

217. *Inorganic Chemistry*. An advanced study of bonding, structures, and reactions of inorganic compounds based on modern physical chemical concepts. Three lectures. Prerequisite: one year of physical chemistry. 3 units. *Wells*

234. *Chemical Instrumentation*. Discussion of physicochemical principles as applied to instrumental methods of analysis, illustrated by lab-

oratory experiments with emphasis on methods involving electrical techniques. Two lectures and three laboratory hours per week. Prerequisites: quantitative and instrumental analysis and physical chemistry; the latter may be taken concurrently. 3 units. *Strobel*

†235. *Advanced Analytical Chemistry*. A theoretical and applied treatment of chemical kinetics, electrode processes, multistage separations, organic reagents, and functional group chemistry as related to modern analytical techniques. Prerequisites: Chemistry 132 and 162. 3 units. *Toren*

240. *Chemical Oceanography*. Physicochemical properties of sea-water, major and minor constituents, trace elements, dissolved gases, the carbon dioxide system, dissolved organic constituents, the nutrient systems and their biochemical and physicochemical aspects, and dynamic equilibria in the chemical systems in the oceans. Laboratory work and field trips to collect data. Prerequisites: one year of physics, mathematics through calculus, a year of analytical chemistry or physical chemistry, an introductory course in general oceanography or a course in physical oceanography, or permission of instructor. (At Beaufort.) 6 units. *Stefansson*

252. *Advanced Organic Preparations*. A laboratory course designed to supplement the student's knowledge of fundamental organic processes by a selected group of laboratory exercises accompanied by oral discussions of techniques and theories pertinent to the experiments. Five hours laboratory and lecture, with lectures in alternate weeks. Prerequisites: one year of organic chemistry. 3 units. *Brown*

253, 254. *Intermediate Organic Chemistry*. An advanced study of the reactions of organic compounds and the theories of organic chemistry. Prerequisite: one year of organic chemistry. 3 units. *Wilder and Porter*

255. *Structural Analysis by Spectroscopic Methods*. A study of the application of modern spectral methods of structure analysis of organic compounds. Topics will include nuclear magnetic resonance, optical rotatory dispersion, circular dichroism, and mass spectrometry. Prerequisites: Chemistry 155 and 253. 3 units. *Jeffer and Rosenthal*

263. *Thermodynamics*. Review of classical thermodynamics, including application of chemical potentials to the treatment of equilibria in multi-component systems. Elementary statistical thermodynamics; use of partition functions for the ideal monatomic gas, harmonic oscillators, and rigid rotators. Derivation of Debye-Hückel equation; special topics. Prerequisite: one year of physical chemistry and one year of calculus. 3 units. *Krigbaum*

264. *Biophysical Chemistry*. A lecture course on the application of the methods of physical chemistry to biological problems. Topics include physical-chemical properties and structural organization of proteins and

†Not offered in 1970-71.

nucleic acids, thermodynamics and kinetics in biological transformations, metal ions in biological systems, selected topics on the application of modern techniques such as circular dichroism relaxation spectrometry, fluorescence, and nuclear magnetic resonance. Prerequisite: Chemistry 160 or 161. 3 units. *Henkens*

267. *Introductory Quantum Mechanics*. The fundamentals of quantum mechanics with elementary applications. Linear algebra; the uncertainty relations; the harmonic oscillator; hydrogen-like systems; angular momentum; perturbation theory; chemical bonding; time-dependent phenomena. Three lectures per week. Prerequisites: Chemistry 162 and permission of the Director of Undergraduate Studies. 1 unit. *Chesnut*

271. *Introduction to Research*. Lectures on the use of chemical literature, research methods, recording and publication of results, and other topics. 1 unit. *Brown*

For Graduates

315. *Advanced Inorganic Chemistry*. Intensive treatment of a few particular areas of modern inorganic chemistry. Mechanisms of inorganic reactions and solid-state chemistry are included, but topics to be considered may be chosen to suit the interests of the group. Prerequisite: Chemistry 217. 3 units. *Palmer*

†316. *Topics in Non-Metal Chemistry*. A general survey of the chemistry of compounds of the non-metals. Special emphasis will be given to preparations, structures, and reactions of compounds of silicon and boron. Prerequisite: Chemistry 217 or equivalent. 3 units. *Wells*

317, 318. *Seminar in Inorganic Chemistry*. Lectures, oral reports, and discussion on advanced topics and recent advances in the field of inorganic chemistry. Prerequisite: Chemistry 217. 2 units. *Palmer and Wells*

331, 332. *Seminar in Analytical Chemistry*. A survey of the current literature of analytical chemistry and discussion of special topics. Prerequisite: Chemistry 234. 2 units. *Strobel and Toren*

†350. *Organic Reactions*. A study of the scope and limitations of the more important types of reactions of organic chemistry from the point of view of their practical use in the synthesis of organic compounds. Prerequisite: Chemistry 253. 2 units. *Bradsher*

†351. *Theoretical Organic Chemistry*. An advanced study of theoretical organic chemistry. Application of physical chemical principles to problems of structure and mechanism in organic chemistry. 2 units. *Porter*

354. *Stereochemistry*. A study of recent advances in stereochemistry of organic compounds including free-radicals and stereospecific reactions. Prerequisites: Chemistry 253 and 255. 2 units. *Wilder*

†Not offered in 1970-71.

355. *Special Topics in the Chemistry of Natural Products*. A study of the structure and biosynthesis of natural products, with particular emphasis on recent advances in the field of alkaloid chemistry. Prerequisite: Chemistry 255. 2 units. *Jeffs*

†356. *Heterocyclic Chemistry*. A study of synthetic methods and physical and chemical properties of selected families of heterocyclic compounds. 2 units. *Quin*

†360. *Polymer Chemistry*. A survey of the methods of preparation of high-molecular-weight organic compounds and a study of the properties characteristic of macromolecules in solution and in the solid state. Prerequisite: Chemistry 263. 2 units. *Krigbaum*

361. *Advanced Polymer Chemistry*. A number of topics in the chemistry and physics of high polymers will be discussed, including polymerization mechanisms and kinetics, crystallization and morphology of high polymers, and solution properties. Prerequisite: Chemistry 360. 2 units. *Peterlin and Schindler*

362. *Kinetics of Chemical Reactions*. A presentation of the more important facts and theories relating to the rates with which chemical reactions occur in the gas phase, in solution, in the solid state, and at phase interfaces. Prerequisite: Chemistry 263. 3 units. *Smith*

364. *Advanced Topics in Physical Chemistry*. A presentation of one or more topics in the field of physical chemistry of special interest to the faculty. Prerequisite: Chemistry 263. 2 units. *Physical Chemistry Staff*

365. *Introductory Statistical Mechanics*. Fundamentals of classical and quantum statistical mechanics. Intermediate statistical thermodynamics. Ensemble theory. Statistical theories of solids and lattices. Prerequisites: Chemistry 263 or 267. 3 units. *Poirier*

366. *Statistical Mechanics*. Statistical mechanics of systems of strongly interacting elements; theories of fluids and solutions. Selected advanced topics: distribution function methods; graph-theoretical methods. Prerequisite: Chemistry 365. Corequisite: Mathematics 285. 3 units. *Poirier*

†368. *Quantum Mechanics*. Molecules in electromagnetic fields, group methods, and electron correlation. Prerequisite: Chemistry 267. Corequisite: Mathematics 285. 3 units. *Chesnut*

373, 374. *Seminar*. Required of all graduate students in chemistry. One hour a week discussion. 2 units. *All Members of the Graduate Staff*

375, 376. *Research*. The aim of this course is to give instruction in methods used in the investigation of original problems. Individual work and conferences. 1 to 6 units. *All Members of the Graduate Staff*

381. *Laboratory in Organic Chemistry*. A course designed to provide laboratory experience in qualitative organic analysis for students lacking

†Not offered in 1970-71.

prior training in this area. Prerequisite: permission of the Director of Graduate Studies. 2 units. *Quin*

382. *Remedial Laboratory in Chemistry*. A course designed to provide laboratory experience in instrumental analysis for students lacking prior training in this area. Prerequisite: permission of the Director of Graduate Studies. 1 unit. *Toren*

Classical Studies

Professor Newton, *Chairman* (326 Carr); Associate Professor Oates, *Director of Graduate Studies* (325 Carr); Professors Richardson, Truesdale, Willis; Associate Professor Womble; Assistant Professor Stanley

The Department of Classical Studies offers programs leading to the A.M. and Ph.D. degrees with majors in Greek, Latin, and ancient history, and minors in archaeology and linguistics. For regular admission to a major in Greek or Latin a student must offer three years of college study above the elementary level in one language and two college years in the other. Students wishing to major in ancient history will be required on entrance to demonstrate satisfactory competence in both Greek and Latin for reading in the primary sources; failure to demonstrate such competence will require modification of the student's program to repair the deficiency.

The department's special requirements of students in addition to the general requirements of the University for the A.M. and Ph.D. degrees set forth in the section on Courses of Study and Degree Requirements of this *Bulletin* are presented in a sheet that may be obtained from the Director of Graduate Studies. They include for the A.M. degree a major and a minor field and for the Ph.D. degree a major and two minor fields, all to be chosen within the general discipline of classical studies, and special requirements in seminar, course work, and the preliminary examination for the Ph.D. degree.

A reading knowledge of German and French is required of all candidates for the Ph.D. degree and knowledge of one, for the A.M. The candidate for the Ph.D. should meet one of the language requirements by the end of his first term in residence and the other by the end of his third term.

Greek

For Seniors and Graduates

203. *Homer*. The *Iliad* and *Odyssey*; the problem of language and structure in the epic; present state of Homeric scholarship. 3 units. *Stanley*

205. *Greek Lyric Poets*. Fragments of the early lyric poets; selected odes of Pindar and Bacchylides. 3 units. *Truesdale*

†206. *Aeschylus*. The *Oresteia* with study of the form of *Agamemnon* and its place in the design of the trilogy. 3 units. *Willis*

†208. *Sophocles*. The Theban plays; the structure and style of Sophoclean tragedy. 3 units. *Willis*

†209. *Euripides*. Representative tragedies in their political and philosophical context; analysis of dramatic form and texture. 3 units. *Stanley*

†210. *Aristophanes*. Origin and development of Greek comedy; representative plays of Aristophanes. 3 units. *Truesdale*

†221. *Early Greek Prose*. Greek prose in the fifth century from the Ionian scientists and logographers to Herodotus, Gorgias, Antiphon, and the Old Oligarch. 3 units. *Truesdale*

222. *Thucydides*. The History; Thucydides' historical method and style. 3 units. *Willis*

223. *Greek Orators I*. Early fourth-century rhetoric, including Andocides, Lysias, and Isocrates. 3 units. *Willis*

224. *Greek Orators II*. Aeschines' *Against Ctesiphon* and Demosthenes' *On the Crown* in the light of fourth-century political history and rhetorical development. 3 units. *Willis*

†225. *Plato*. Selected dialogues and related passages illustrating the development of philosophical topics and stylistic motifs. 3 units.

†231. *Hellenistic Poetry*. The principal lyric, elegiac, pastoral, and didactic poets of Alexandria; emphasis on Callimachus and Theocritus. 3 units. *Stanley*

241. *Advanced Prose Composition*. Xenophon, Lysias, and other prose authors as models of style and practice in the writing of Attic prose. 1 unit. *Willis*

For Graduates

(At least two of these are offered each year.)

301. *Greek Seminar I*. 3 units. *Stanley*

302. *Greek Seminar II*. 3 units. *Willis*

303. *Greek Seminar III*. 3 units.

304. *Greek Seminar IV*. 3 units.

305. *Greek Seminar V*. 3 units.

306. *Greek Seminar VI*. 3 units.

311. *Proseminar in Papyrology*. 3 units. *Willis*

313. *Proseminar in Greek Epigraphy*. 3 units. *Oates*

321. *Seminar in Literary Papyri*. 3 units. *Willis*

323. *Seminar in Documentary Papyri*. 3 units. *Oates*

†Not offered in 1970-71.

Latin

For Seniors and Graduates

201. *The Verse Treatise*. The genre of didactic poetry; emphasis on Lucretius' *De Rerum Natura*, Vergil's *Georgics*, and Ovid's *Ars Amatoria*; attention to Cicero's *Aratea*, the *Astronomica* of Manilius, Horace's *Ars Poetica*, and Ovid's *Fasti*. 3 units. *Newton*

202. *Roman Satire*. A survey of the genre, with concentration on Horace, Juvenal, and Persius. 3 units. *Womble*

†203. *Epic: Vergil*. The *Aeneid*. 3 units. *Newton*

†204. *Epic: Lucan and Statius*. The development of the Roman epic in the Silver Age. 3 units. *Richardson*

†207. *The Prose Epistle*. The letter as a vehicle of communication and as a literary form. 3 units. *Richardson*

†208. *The Epistle in Verse*. The verse letter as a literary form; reading in the *Epistles* of Horace, the *Heroides* of Ovid, and Statius. 3 units. *Womble*

†209. *Fragments of Early Latin*. The remains of Latin poetry of the third and second centuries B.C., from Livius Andronicus to Lucilius, with emphasis on the epic and drama of Ennius. 3 units. *Stanley*

210. *Lyric and Occasional Poetry*. Shorter verse forms; epigram, pastoral, song, and panegyric. 3 units. *Womble*

†211. *Roman Oratory I*. The literary history and criticism of Roman oratory. 3 units. *Richardson*

†212. *Roman Oratory II*. A continuation of Latin 211. 3 units. *Womble*

221. *Mediaeval Latin I*. Latin literature of late antiquity, from Prudentius to the Carolingian Revival. 3 units. *Newton*

222. *Mediaeval Latin II*. Literature in Latin from Charlemagne to the Renaissance. 3 units. *Newton*

241. *Advanced Latin Composition*. Experiments in imitation of the great Latin prose styles and introduction to the composition of verse. 1 unit. *Richardson*

For Graduates

(At least two of these are offered each year.)

301. *Latin Seminar I*. 3 units. *Richardson*

302. *Latin Seminar II*. 3 units. *Newton*

303. *Latin Seminar III*. 3 units.

304. *Latin Seminar IV*. 3 units.

305. *Latin Seminar V*. 3 units.

306. *Latin Seminar VI*. 3 units.

†Not offered in 1970-71.

312. *Proseminar in Latin Palaeography*. 3 units. Newton
 314. *Proseminar in Latin Epigraphy*. 3 units.
 315. *Proseminar in Roman Law*. 3 units.

Classical Studies

For Graduates

301. *Introduction to Classical Philology*. Introduction to the bibliography and principal disciplines of the field. 3 units. Willis and Graduate Staff

Classical Studies (Ancient History)

For Seniors and Graduates

253. *Greece to the Orientalizing Period*. 3 units. Oates
 †254. *The Age of the Tyrants and the Persian Wars*. 3 units. Oates
 †255. *The Age of Pericles*. 3 units. Oates
 †256. *The Fourth Century through Alexander*. 3 units. Oates
 †260. *The History of Rome to 146 B.C.* 3 units. Staff
 261. *The Roman Revolution, 146-30 B.C.* 3 units. Oates
 262. *Rome under the Julio-Claudians*. 3 units. Staff
 †263. *From the Flavian Dynasty to the Severan*. 3 units. Staff
 270. *The Rise of the Hellenistic Kingdoms*. 3 units. Oates
 271. *The Hellenistic Kingdoms 250-31 B.C.* 3 units. Oates

For Graduates

(At least two of these are offered each year.)

321. *Seminar in Ancient History I*. 3 units. Oates
 322. *Seminar in Ancient History II*. 3 units. Oates
 323. *Seminar in Ancient History III*. 3 units.
 324. *Seminar in Ancient History IV*. 3 units.

Classical Studies (Archaeology)

For Seniors and Graduates

231. *Greek Sculpture*. Techniques and styles of the major schools and personalities in archaic, classical, and Hellenistic free-standing and architectural sculpture. 3 units. Stanley

232. *Greek Painting*. Techniques and style in the various media; emphasis on the problems of chronology, attribution, and iconography of Attic pottery. 3 units. Stanley

†Not offered in 1970-71.

235. *Roman Architecture*. Significant monuments chosen to exemplify the Roman genius in building in the late Republic and early empire. 3 units. *Richardson*

†236. *Roman Painting*. Roman pictorial art with concentration on the wall-paintings from Campania. Investigation of techniques, iconography, and the use of pictures in decoration. 3 units. *Richardson*

For Graduates

(One offered each year.)

311. *Archaeology Seminar I*. 3 units. *Stanley*

312. *Archaeology Seminar II*. 3 units.

Under the terms of a cooperative agreement, graduate students of Duke University may, with the approval of the chairman of their major department, take any graduate course offered by the Department of Classics of the University of North Carolina by the payment of a nominal fee. A list of these courses will be sent upon request.

Comparative Literature

No graduate degree is offered in comparative literature. The following courses may serve in the minor programs of students in other departments. Professor Salinger is Chairman of the Department of Germanic Languages and Literature.

201, 202. *Romanticism*. Studies in the origin, rise, and development of the Romantic Movement in the chief literatures of the Western World. The approach is comparative; the principal emphasis will be on England, France, and Germany with some reference to other countries. Selected subjects will occasionally be covered in lectures by speakers from various departments of the University. 6 units. *Salinger*

203, 204. *Realism and Symbolism*. Comparative studies in the literatures of England, France, Germany, Russia, the Scandinavian countries, Spain, and Italy, tracing the decline of romantic individualism and the reappraisal of man's significance against the social background. Selected subjects will occasionally be covered in lectures by speakers from various departments of the University. 6 units. *Salinger*

*205. *Foundations of Twentieth-Century European Literature*. The roots of the contemporary scene (Proust, Mann, Rilke, Kafka, Eyvind Johnson, Anouilh, Lagerkvist, Camus, Hesse) evolving toward a mythology of man. 3 units. *Salinger*

†Not offered in 1970-71.

*Offered on demand.

Slavic 236. *Russian and Polish Romanticism*. Prose, poetry, drama of such major writers as Pushkin, Lermontov, Mickiewicz, and Krasinski presented against the background of the Romantic Movement in Western Europe. 3 units. *Krynski*

Economics

Professor Blackburn, *Chairman* (302 Social Science); Professor Yohe, *Director of Graduate Studies* (313 Social Science); Professors Davies, de Vyver, Goodwin, Hanna, Kreps, Naylor, Rottenberg, Saville, and Spengler; Associate Professors Havrilesky, Trembl, and Vernon; Assistant Professors Clark and Graham; Visiting Professor Broussalian; Visiting Associate Professor Tangri

The Department of Economics offers graduate work leading to the A.M. and Ph.D. degrees. A student entering graduate work in economics should have completed with satisfactory grades at least twelve semester hours of undergraduate work in economics, including six hours of principles of economics. Among the undergraduate courses of distinct advantage to the graduate student in economics are general accounting, elementary statistics, intermediate economic theory, money and banking, international trade, and basic courses in philosophy, mathematics, and social sciences other than economics.

Requirements for the Ph.D. in economics include a core of courses or equivalent preparation in mathematical economics, statistical methods, microeconomic and macroeconomic theory, and the history of economic thought. Economic growth and demography, money and banking, international trade, labor economics, economic history, public finance, industrial organization, statistics, and econometrics are optional fields, of which the student elects at least two in preparation for the preliminary doctoral examination. Course requirements for the Ph.D., including a minor field, should be completed in four semesters of residence.

For Seniors and Graduates

*233. *State and Local Finance*. A study of expenditures, taxation, and financial administration in state and local governments with emphasis on current problems. Special attention will be given to research methods and materials and to the financial relations between state and local governments. 3 units. *Davies*

237, 238. *Statistical Methods*. A study of statistical methods appropriate for dealing with problems in business and the social sciences. In

*Offered on demand.

addition to developing more thoroughly the subject considered in Business Statistics, the following methods will be considered: multiple, partial, and curvilinear correlation; curve fitting; probability; sampling distributions; and statistical inference. Prerequisite: Economics 138 or consent of the instructor. Either semester may be taken for credit. 6 units. *Hanna*

243. *Econometrics I*. Economic theory, mathematics, statistical inference, and electronic computers applied to analysis of economic phenomena. Objective is to give empirical content to economic theory. Matrix algebra used to develop topics in inference, linear regression, and systems of simultaneous equations. Use is made of the electronic computer. 3 units. *Naylor*

244. *Econometrics II*. A course on the design of computer simulation experiments for economic systems. Topics include generation of stochastic variates, computer models of queueing and inventory systems, models of the firm and industry, models of the economy, simulation languages, and experimental design. 3 units. *Naylor*

‡262. *Trade Unionism and Collective Bargaining*. An intensive survey of the trade union as an economic institution is followed by a study of the principles and problems of union-management relationship as found in collective bargaining. 3 units. *de Vyver*

‡265. *International Trade and Finance*. A study of the fundamental principles of international trade and foreign exchange. Subjects covered will include international specialization, balance of payments, foreign investments, tariffs and commercial policies, exchange control, exchange rates, and international monetary problems. 3 units. *Clark*

‡293. *Soviet Economic History*. A study of economic policy-making in the U.S.S.R. in a historical setting. Review of main stages of Soviet development and of evolution of economic institutions. 3 units. *Treml*

‡294. *Soviet Economic System*. A study of the Soviet economic system with an emphasis on theoretical problems of allocation of resources, economic development, and optimal micro decision-making in a non-market economy. Prerequisite: Economics 293 or permission of instructor. 3 units. *Treml*

301. *Microeconomic Analysis I*. Review of contemporary theory relating to production, the firm, and income distribution in competitive and imperfectly competitive markets. 3 units. *Naylor and Graham*

302. *Microeconomic Analysis II*. A continuation of Economics 301, with emphasis on analyses of consumer behavior, general equilibrium, welfare economics, and capital theory. Prerequisite: Economics 301. 3 units. *Naylor and Graham*

‡Graduate students in economics normally will not receive credit for courses so marked. These courses may be taken for credit by non-economics graduate students, with the consent of the instructor.

303. *Theory of Economic Decision-Making*. The extension of economic theory to the allocation of resources within firms and governmental units. Prerequisite: Economics 301 or its equivalent. 3 units. *Broussalian*

304, 305. *Seminar in Money and Banking*. In the first semester, a survey of theories of the level and structure of interest rates and the relationships among the money supply, interest rates, income, and price levels; second semester, recent issues in monetary theory and monetary policy, particularly theories of credit rationing, the financial intermediaries controversy, and the monetary policy transmission mechanism. 3 units each semester. *Yohe and Havrilesky*

307. *Quantitative Analysis I*. A systematic analysis of the principal quantitative methods used in microeconomic theory. Neo-classical theories of production and distribution are used as vehicles for presenting the material. Considerable emphasis is placed on the application of mathematical analysis to economic models. 3 units. *Naylor and Vernon*

308. *Quantitative Analysis II*. Linear economic models, particularly Leontief models, are used in the exposition. Primary emphasis is placed on the application of mathematics to economic theory. Prerequisite: Economics 307 or consent of instructor. 3 units. *Naylor and Vernon*

311. *History of Political Economy*. A detailed review of the development of economic theory, the tools of economic analysis, and economic theory as a science, together with an analysis of the circumstances affecting this development. Period covered: pre-Christian times through 1936. 3 units. *Spengler and Goodwin*

313, 314. *Seminar in Economic Theory*. Prerequisite: Economics 301 or its equivalent. 3 units each semester. *Staff*

316. *Seminar in Economics of Soviet-Type Socialism*. Selected topics in analysis of theoretical and institutional framework of Soviet economic system, such as markets versus plan, optimizing techniques in planning, price determination, balanced economic development, and ideology and economic policy. *Tremblay*

317. *Seminar in Demographic, Population, and Resource Problems*. 3 units. *Spengler*

318. *Dissertation Seminar*. 3 units. *Staff*

319. *Seminar in the Theory and the Problems of Economic Growth and Change*. 3 units. *Rottenberg and Spengler*

320. *Macroeconomic Analysis I*. Measurement of national income and other important aggregates; classical macroeconomics; Keynesian and more recent views of the determinants of income, employment, and price levels; empirical studies of consumption, investment, and monetary variables. 3 units. *Blackburn*

321. *Theory of Quantitative Economic Policy*. The use of mathematical models in analyzing the connections between means and ends of economic policy; topics covered include principles and design, centralization and

decentralization, stabilization and growth policies, welfare optimization, imperfect models, and the use of control system analysis. Prerequisite: Economics 320. 3 units.

322. *Macroeconomic Analysis II*. Further analysis of topics treated in Economics 320. Optimal economic growth; business cycles. Issues in economic policy. Prerequisite: Economics 320. 3 units. *Blackburn*

329. *Federal Finance*. An analysis of the trends and hypotheses concerning the growth in governmental activity, the optimum level and composition of governmental spending, and the microeconomic and macroeconomic effects of governmental spending and tax policies. 3 units. *Davies*

330. *Seminar in Public Finance*. 3 units. *Davies*

331. *Seminar in Economic History*. 3 units.

*340. *National Income*. A critical survey of the conceptual framework and structure of national income and its components, the reliability of national income estimates, and their use in analyzing questions of economic policy. 3 units. *Hanna*

355. *Seminar in Labor Economics*. 3 units. *de Vyver*

358. *Seminar in Labor Market and Related Analysis*. 3 units. *Rotenberg*

365. *Seminar in International Economics*. 3 units. *Clark*

366. *Monetary Aspects of International Trade and Finance*. The monetary, as opposed to the pure, side of international economics. Among the topics considered are the balance of payments, the foreign-exchange market, capital movements, payments equilibrium, the demand for reserves, and international monetary reform. 3 units. *Clark*

*388. *Industrial Organization*. The theory, measurement, and history of the firm-structure of industry. Emphasis upon the structure of American industry and upon actual production and pricing practices. Criteria for evaluating industrial performance. 3 units. *Vernon*

*389. *Seminar in Industrial and Governmental Problems*. 3 units.

397, 398. *Directed Research*.

401. *Seminar on the British Commonwealth*. 3 units. *Spengler, Braibanti, and Preston*

Related Courses in Other Departments

Courses comprising a candidate's minor may be selected from fields of forestry, history, mathematics, philosophy, political science, and sociology and anthropology, or from an area that complements the candidate's area of research interests in economics.

See Program in Comparative Studies on Southern Asia and The Population Studies Program in the chapter on Special and Cooperative Programs for further information.

*Offered on demand.

Education

Professor Cartwright, *Chairman* (08D West Duke Building); Professor Hurlburt, *Director of Graduate Studies* (07 West Duke Building); Professors Bowman, Gehman, Githens, Hopkins, Petty, Shuman, and Weitz Adjunct Professors Boozer and J. Davis; Associate Professors Ballantyne Colver, Di Bona, C. Johnson, Katzenmeyer, Martin, Pittillo, Spaulding and Sublett; Visiting Associate Professor Erickson; Adjunct Associate Professors L. Davis and Roueche; Assistant Professor Carbone; Adjunct Assistant Professor Herrscher; Lecturer Engelhart

For Seniors and Graduates

Graduate work in education is offered leading to the A.M., the M.Ed., the M.A.T., the Ed.D., and the Ph.D. degrees. For each of these degrees there are specific requirements and prerequisites, all of which may be found stated in detail in this *Bulletin*, pp. 1-17. Department requirements and prerequisites for all of these degrees may be obtained from the Director of Graduate Studies.

From the courses listed below, plus several in related disciplines, a selection may be made which will meet North Carolina requirements for the Advanced Principal's Certificate, the Superintendent's Certificate, and the Supervisor's Certificate.

(Some courses below are offered only in the Summer Session; see the *Bulletin of the Summer Session*.)

These programs are accredited by the National Council for Accreditation of Teacher Education for the preparation of elementary and secondary school teachers and school service personnel with the doctor's degree as the highest degree approved.

201. *Teaching and Supervision of Arithmetic*. This course gives special attention to the number system, the fundamental operations (with whole numbers, fractions, and decimals), percentage, and measurements. Consideration given to meaning theory, method of teaching, problem-solving, evaluation, practice and drill, and selection and gradation of arithmetical contents. Designed for teachers and supervisors in the elementary school. 3 units. *Petty*

202. *Comparative and International Education: Industrialized Nations*. A study of the structure and functioning of educational institutions and processes in selected developed societies. Emphasis on the application of relevant social science theory and methods to the problems of education. 3 units. *Di Bona*

204. *Educational Organization*. Explores theory and research on the processes of exchange between educational organizations and their external environments, and the influence of these processes on organizational structure, goals, and practices. Schools, colleges, and universities

are considered as separate types of educational organizations, and a comparative approach is emphasized in examining these as well as other forms of social organizations, e.g., hospitals, businesses, and prisons. 3 units. *Martin*

206. *Studies in the History of Educational Philosophy*. A consideration of the educational views of some leading thinkers in the history of Western philosophy. Special attention is given to selections from the writings of Plato, Augustine, Locke, Rousseau, Kant, Whitehead, Dewey, and others. 3 units. *Carbone*

207. *Social History of Twentieth-Century American Education*. The development of twentieth-century American education in the context of social and intellectual history. 3 units. *C. Johnson*

211. *The Problem Child*. Study of problem behavior and adjustment in children with emphasis on the causes and treatment of conduct and neurotic disorders of the maladjusted child. Particular attention will be paid to mental hygiene principles in the handling of problem children in school and home. (Listed also as Psychology 211.) 3 units. *I. Gehman*

*213. *Elementary-School Organization and Administration*. This course is designed especially for principals, teachers, and other prospective members of the elementary-school staff. The scope of elementary education is considered to encompass nursery school, kindergarten, and the elementary school. Special treatment is given to the problems of internal organization and management of the elementary school, and its integration with the secondary-school level. 3 units. *Sublett*

215. *Secondary Education: Principles*. Intensive study of principles, curriculum, and methods in secondary education. Accelerated course meeting six hours a week for half a semester. Must be accompanied by Education 216. 3 units. *Cartwright, Githens, Shuman, and C. Johnson*

216. *Secondary Education: Internship*. Supervised internship in junior or senior high schools. Full-time observation and teaching for half a semester, accompanied by Education 215; or, with permission of the department, full-time teaching for a semester, accompanied by Education 315. Students carrying Education 216 for credit toward a master's degree will be required to take six hours of senior or graduate work in addition to the normal degree requirements. 6 units. *Cartwright, Githens, Hurlburt, Shuman, and C. Johnson*

217. *The Psychological Principles of Education*. An advanced study of teaching, learning, and the learner. Selected problems guiding the reading of students will be discussed in class. 3 units. *Gehman, L. Davis, and Weitz*

218. *Comparative and International Education: Developing Societies*. A study of the structure and functioning of educational institutions and processes in selected developing nations. Emphasis is placed on the ap-

*Offered on demand.

plication of relevant social science theory and methods of the problems of education. 3 units. *Di Bona*

219. *Comparative and International Education: South Asia*. Traditional and modern educational developments are studied in the cultural context of the region. Emphasis is placed on the social, political, and economic consequences of schooling in India and Pakistan. 3 units. *Di Bona*

*223. *Teaching the Language Arts*. Comparison of current methods and materials in the teaching of handwriting, spelling, and oral and written composition. Analysis and correction of basic difficulties. Increasing opportunities for creative expression. Correlation of language arts with other activities and school subjects. 3 units.

225. *The Teaching of History and the Social Studies*. Evaluation of the objectives, content, materials, and methods in the teaching of history and the social studies. 3 units. *Cartwright*

226. *Teaching Reading in the Elementary School*. A study of the nature of the reading process and of principles, methods, and materials for the developmental and remedial programs. 3 units. *J. Johnson*

229. *Formal and Informal Classroom Diagnosis of Reading Disability Cases*. Designed to acquaint teachers, supervisors, and administrators with various standardized tests, other instruments, and informal procedures utilized in diagnosing reading problems of elementary and secondary pupils. 3 units. *J. Johnson*

233. *Improvement of Instruction in English*. This course will acquaint the student with recent developments in the teaching of English and will introduce him to research techniques in the field. Each student will pursue an extensive independent study based on his particular interests. 3 units. *Shuman*

234. *Secondary-School Organization and Administration*. This course is designed especially for principals, teachers, and other prospective members of the secondary-school staff. The scope of secondary education is considered to encompass junior high school, regular high school, senior high, and junior college. Special treatment is given to the problems of internal organization and management. 3 units. *Pittillo*

*236. *Teaching Reading in the Secondary School*. A study of the nature of the reading process and of principles, methods, and materials for the development of effective reading attitudes and skills as applied both to developmental and remedial programs. The course provides practice with secondary-school children suffering reading retardation, including testing, diagnosis, and daily remedial teaching during a six-week period. For secondary-school teachers of all subjects who wish to improve the reading and study habits of their students. 3 units. *J. Johnson*

237. *The Teaching of Literature in Secondary Schools*. This course

*Offered on demand.

surveys the literature generally taught in secondary schools. Both adult and transition-type literature are considered. Methods of organizing the program and of teaching literature are explored. 3 units. *Shuman*

238. *Content, Supervision, and Administration of Reading Programs.* The nature and functions of the objectives of various reading programs, organization of such programs, their major attributes, and their evaluation. For supervisors, teachers, and administrators. 3 units. *J. Johnson*

239. *The Teaching of Grammar, Composition, Mechanics, and Usage in Secondary Schools.* This course will be concerned with recent developments in the teaching of grammar, composition, mechanics, and usage. Students will write and grade compositions. Each student will undertake an appropriate term project. 3 units. *Bowman and Shuman*

240. *Career Development.* Educational, psychological, and sociological origins of individual career development; theories of career development and placement of job choice in general human growth and development; use of occupational and educational information. 3 units. *Ballantyne and Colver*

241. *Principles of Guidance and Student Personnel Work.* A study of the history, philosophy, principles, and scope of guidance work in elementary and secondary education and student personnel work in higher education. 3 units. *Ballantyne and Colver*

243. *Personality Dynamics.* A study of personality structure and dynamics with emphasis upon the implications for counseling and instruction. Prerequisite: six hours of psychology or educational psychology. 3 units. *Gehman*

244. *Counseling Techniques.* A study of individual counseling techniques including diagnosis, interviewing, program planning, and counseling evaluation. Prerequisites: Education 243 and 258 or equivalent, which may be taken concurrently. 3 units. *Gehman*

245. *Theories of Counseling.* A study of the major theories of counseling. 3 units. *Weitz*

246. *The Teaching of Mathematics.* This course deals with such topics as aims, curriculum, course and lesson planning, and classroom procedure for teaching secondary-school mathematics. 3 units. *Reynolds*

248. *Practicum in Counseling.* Practice in individual counseling, including test administration, intake interviewing, diagnosis, counseling, program planning, report preparation, and evaluation. The student will be expected to devote about 150 hours to case work and conferences with his supervisor. Prerequisite: Education 244. 3 units. *Staff*

249. *Exceptional Children.* A survey of the major categories of exceptional children: mental retardation, emotional disturbance, brain injured, learning disabilities, physically handicapped, visual and auditory deficits, culturally deprived, and gifted. Etiology (biological and environmental factors), diagnosis, and treatment will be discussed. 3 units. *Erickson*

250, 251. *Teaching Emotionally Disturbed Children: Internship*. Basic principles and practices in teaching and the organization of instructional materials. Work with children under the supervision of a certified teacher of emotionally disturbed children. Experience in general classroom teaching and small group and individualized instruction. Participation in staff conferences involving psychiatrists, psychologists, social case workers, and professional educators. 3 units each semester. *Gehman*

*252. *The School in the Legal Structure*. Designed to show the legal relationships of the school to federal, state, and local governments. Considerable attention to legal rights, responsibilities, and liabilities of the teacher. 3 units. *Martin*

253. *Law and Education*. This course examines elements and problems of educational organization which have come within the purview of constitutional and legislative provisions and court decisions. Emphasis is placed on conflict among members of educational organizations and between educational organizations and other parties which has resulted in appellate court decisions. Students are expected to select appropriate problems for intensive study. 3 units. *Martin*

255. *Assessment of Abilities*. A study of the selection or construction, use, and interpretation of various types of instruments for predicting and evaluating the outcome of educational experiences; surveys of standardized tests of aptitude and achievement and instruction and practice in constructing tests for the classroom. 3 units. *Colver*

258. *Assessment of Personality, Interests, and Attitudes*. A study of the rationale, construction, use, and interpretation of standardized instruments designed for the assessment of students' interests, attitudes, and personality. Special emphasis will be directed to the use of these instruments in counseling. Prerequisites: Education 243 and 255, or approval of instructor. 3 units. *Weitz and Colver*

260. *Introduction to Educational Research*. Research methodologies: experimental, historical, survey, philosophic, and case study. Fundamentals of statistical inference, research design, and computer applications to research problems. 3 units. *Katzenmeyer*

261. *Intermediate Educational Research*. Intermediate topics in statistical inference. Analysis of covariance and multiple regression. Computer applications in research. Research design. Prerequisite: Education 260 or its equivalent. 3 units. *Katzenmeyer*

*266. *Science in the Elementary School*. Presentation of basic concepts in natural and physical science through selected readings, the use of simple experiments and demonstrations, construction and use of equipment, and field studies. 3 units. *Githens*

270. *The Junior College*. A study of the history and role of the junior college, and of problems and issues confronting the two-year college.

*Offered on demand.

Designed as an introduction to the junior college for students preparing to be teachers or administrators. 3 units. *Roueche*

276. *The Teaching of High-School Science*. Discussion, lectures, and collateral reading, related to such topics as aims, tests, curriculum, classroom and laboratory procedure, field trips, and course and lesson planning for secondary-school science. 3 units. *Githens*

*285. *Audio-Visual Aids in Education*. The aims and psychological bases of audio-visual materials in the classroom. Attention to such materials as charts, filmstrips, flat pictures, maps, models, motion pictures, radio, records, slides, and television. 3 units.

291. *Public and Community Relations of Schools*. A study of the relationships between the entire school or school system and the several publics, especially to the community of a given school. Media for interpreting needs and views of the school to the public and vice-versa will be explored. Both public and private schools studied. 3 units.

For Graduates

300. *Individual Assessment of Intelligence*. A study of theories of individual intelligence testing with emphasis on the Stanford-Binet and Wechsler. Supervised practice in administering, scoring, and interpreting. Prerequisite: Education 255. 3 units. *Ballantyne*

306. *Seminar in Philosophical Analysis of Educational Concepts*. Selected writings of contemporary philosophers, with special emphasis on such educational concepts as: teaching, learning, knowing, understanding, indoctrination, explanation, and education. 3 units. *Carbone*

311. *Group Counseling*. A study of theories and techniques of counseling for small groups of children, adolescents, teachers, parents, and other adults. Simulated practice through recorded interviews, transcribed counseling sessions. Prerequisites: Education 244 and Education 245. *Gehman*

315. *Seminar in Secondary-School Teaching*. Advanced-level consideration of principles, practices, and problems in secondary-school instruction. Designed particularly to accompany an internship. For students without previous internship credit, this course must be accompanied by Education 216. 3 units. *Hurlburt and C. Johnson*

321. *The Superintendency*. A study of the management of the public school system. This course is intended for school executives who have or are preparing to have system-wide responsibilities. 3 units. *Pittillo*

322. *Planning and Management of Educational Facilities*. A study of planning and management of educational facilities and equipment. This course is intended for teachers, administrators, and supervisors. 3 units. *Pittillo*

*323. *Public School Finance*. A study of educational costs, sources of

*Offered on demand.

revenue for the support of public education, collection of revenue, basis of distribution, and accounting for funds spent. 3 units. *Pittillo*

332. *Supervision of Instruction*. A study of the nature of supervision, underlying principles, and techniques of working with individual teachers and with groups. 3 units. *Hurlburt*

333. *Seminar in Higher Education*. An examination of current problems in American higher education, with special emphasis on case studies in organization, administration, and evaluation. For graduate students interested in the administration of higher education or college teaching with consent of the instructor. 3 units. *Hopkins*

335, 336. *Seminar in School Administration*. Organization and control over public education. First semester: attention to governance of education as exercised by the different branches and levels of government. Second semester: administrative organization. 3 units each semester. *Hurlburt, Petty, Pittillo, and Sublett*

337. *Seminar in Community College Organization*. Discussion of the nature, function, and organization of community colleges. Research, writing, and reporting on selected problems. 3 units. *Hurlburt*

338. *Seminar in Educational Supervision*. Open to students who have completed Education 232 or its equivalent. 3 units. *Hurlburt*

339. *Seminar in Curriculum*. Research, writing, and reporting on selected problems. 3 units. *Cartwright and Sublett*

340. *Seminar in Social Studies Curriculum*. Research, writing, and reporting on selected problems. 3 units. *Cartwright*

341. *Seminar in Elementary School Curriculum*. Research, writing, and reporting on selected problems. 3 units. *Sublett*

342. *Seminar in Secondary School Curriculum*. Research, writing, and reporting on selected problems. 3 units. *Cartwright*

343. *History of Higher Education in America*. A history of the growth and development of higher education in the United States from 1636 to the present. The early role of religious groups in establishing colleges, the continuing role of private higher education, and the evolutionary development of public higher education, including state and land-grant universities, teachers colleges, state colleges, and community colleges, are stressed. 3 units.

344. *Research in Higher Education*. Review of theory, practice, and contribution of research as an aid in understanding the functioning of institutions of higher education. Emphasis on empirical studies utilizing the approach and methods of social science. Also specific concern with historical, economic, and philosophical approaches. Will consider new or emerging frontiers of study such as channels of access to higher education, assessment of the learning environment, attitudinal changes in college students, and contribution of the college to societal needs. 3 units. *J. Davis*

345. *Seminar in Reading Instruction and Research*. A study of the

major problem areas in contemporary reading teaching, with emphasis on theoretical, historical, and philosophical contributions to the formulation of objectives and methodologies in modern reading instruction. 3 units. *J. Johnson*

348, 349. *Seminar in Child Psychopathology*. Under the direction of a child psychiatrist, the student will select one elementary school age child for a psychoanalytic study of neurotic conflicts, unconscious motivations, dream work, defense mechanisms, and transference phenomena. Prerequisite: permission of instructor. 3 units each semester. *Fowler*

350, 351. *Directed Activities in Education*. Selected internship experiences at an advanced level under supervision of appropriate staff. Prerequisite: approval of instructor. 3 units each semester. *Staff*

354. *Seminar in Law and Educational Organization*. Research, writing, and reporting on selected problems. Prerequisites: Education 204 and 253, or by consent of instructor. 3 units. *Martin*

360. *Seminar on Instructional Strategies*. This seminar will present various theoretical and analytical models for comprehending teacher instructional strategies and teacher-student interaction in regard to their influence on the learning process. Students will review relevant research, analyze tapescripts and videotapes of classroom performance, and pursue applications of the models in a variety of settings. 3 units. *Herrscher*

Engineering

George Wilbur Pearsall, D.Sc., *Acting Dean* (136 Engineering)

The School of Engineering offers programs of study and research leading to the degrees of Master of Science and Doctor of Philosophy with a major in civil, electrical, mechanical, or biomedical engineering. These programs are designed to provide a fundamental understanding of the science of engineering, which is based on mathematics and the physical sciences, as well as a basic understanding of the art of engineering, which depends on human imagination and judgment. Each engineering graduate student participates in seminars appropriate to his field of study.

A *minimum* of 30 units of earned graduate credit beyond the bachelor's degree is required for the M.S. degree: 12 in engineering, 6 in related minor work (normally mathematics or natural science), 6 in either the major or minor subject or in other areas approved by the major department and the Dean of the School of Engineering, and 6 for a research-based thesis. A non-thesis option requiring 30 units of course credit is available. Each of the departments imposes additional requirements in the exercise of this option. There is no language requirement for this degree.

A *minimum* of 60 units of earned graduate credit beyond the bachelor's

degree is required for the Ph.D. degree: 24 in engineering, 12 in related minor work (normally mathematics or natural science), 12 in either the major or minor subject or other areas approved by the major department and the Dean of the School of Engineering, and 12 for a research-based dissertation. In addition, a reading knowledge of one foreign language which is relevant to the field of the dissertation is required (normally French, German, or Russian). The language requirement may be waived under certain circumstances. The directors of graduate studies will, during the first period of full-time registration of each doctoral aspirant, appoint a program advisory committee consisting of three members of the graduate faculty in areas relevant to the student's intended major. The preliminary examination may be either written, oral, or a combination of written and oral components, at the discretion of the committee.

Biomedical Engineering

Professor Pilkington, *Chairman* (319 Old Chemistry); Associate Professors Clark, Hills, and Thurstone; Assistant Professors Hammond, and Wachtel

Biomedical engineering is often defined as the application of the concepts and methods of the physical, mathematical, and engineering sciences to biology and medicine. This definition covers a broad spectrum ranging from formalized mathematical theory through experimental science to practical clinical applications. The purpose of the graduate program in biomedical engineering is to encourage the optimum combining of engineering and biomedical course work with an interdisciplinary research topic so that the graduates of this program can contribute at the most advanced professional level to the interdisciplinary field of biomedical engineering. The major research areas available include: biomechanics; biomedical materials; biomedical modeling; data acquisition and processing; and electrophysiology.

BME 201. *Introductory Biomedical Engineering I.* Fundamentals of biomedical engineering, with particular emphasis on cellular, neural, circulatory, and respiratory phenomena and their representation by analytical models. 4 units. *Wachtel, Hammond, and Pilkington*

BME 202. *Introductory Biomedical Engineering II.* A continuation of BME 201 with particular emphasis on biological interactions of artificial materials and prostheses, environmental studies and hyperbaric exposure, and instrumentation related to biomedical data acquisition and processing. Prerequisite: BME 201. 4 units. *Hammond, Clark, and Hills*

BME 265. *Advanced Topics in Biomedical Engineering.* Advanced subjects related to programs within biomedical engineering, tailored to fit the requirements of a small group. Prerequisite: approval of the chairman and the instructor under whom work will be done. 1-4 units. *Staff*

BME 311. *Inverse Biomedical Models.* Analytical and computational methods for determining the internal state of a biological system from a set of external measurements and a priori characterization of the system. Differences and integral equation formulations of volume conductor problems, variational methods, perturbation techniques, eigenvalue problems, and quasilinearization. Particular emphasis is placed on the inherent limitations and difficulties encountered in obtaining numerical solutions from inverse formulations and the value of constraints in reducing these difficulties. 3 units. *Pilkington*

BME 323. *Biomedical Materials and Artificial Organs.* The use of artificial organs to replace or augment natural function in pumping and oxygenation of blood, removal of nitrogenous wastes and other toxins, and prostheses which have mechanical, chemical, or cosmetic function. Emphasis is placed on molecular architecture of materials for use in biological environment and optimization of parameters of materials which determine their utility in varying applications. 3 units. *Clark*

BME 333. *Biomedical Imaging.* A study of the fundamentals of information detection, processing, and presentation associated with imaging in biology and medicine. Analysis of coherent and incoherent radiation and various image generation techniques. Also covered will be the psychometrics of image evaluation dealing with subjective and objective parameters. Emphasis will be placed upon sonography, thermography, X-ray, various forms of nuclear radiography, microscopy, and holography. 3 units. *Thurstone*

Civil Engineering

Professor Vesić, *Chairman* (121 Engineering); Associate Professor Muga, *Director of Graduate Studies* (118-I Engineering); Professors Brown and Bryan; Associate Professors Hill, Kumar, and Palmer; Assistant Professors Clough, Dvorak, and J. Wilson

A student may specialize in one of the following fields of study for either the M.S. or the Ph.D. degree with a major in civil engineering: engineering mechanics, hydraulic and ocean engineering, materials science, sanitary engineering, soil mechanics and foundation engineering, or structural engineering. Appropriate combinations of these fields are also encouraged. Each graduate student participates in seminars appropriate to his field of study.

With the approval of the department, a master's degree candidate in civil engineering may choose, in lieu of submitting a thesis, to complete six additional units of course work plus a special project. If the candidate elects this alternative, he is expected to take a comprehensive examination over his graduate course work, and also to defend orally his special project.

The candidate for the Ph.D. degree must have a reading knowledge of at least one foreign language. Normally, this is French, German, Russian, or Spanish, but other languages may be considered by petition to the department.

Under the Reciprocal Agreement with the Consolidated University of North Carolina, a student may include as a portion of the minimum requirements work offered by the Department of Environmental Sciences and Engineering of the University of North Carolina. Although minor work normally is taken in the natural sciences or mathematics, a student whose major interest relates to the social sciences may take relevant minor work in this area.

A minimum prerequisite to the graduate program in civil engineering is a basic knowledge of mathematics through linear differential equations, materials science, solid mechanics, and fluid mechanics.

CE 201. *Advanced Mechanics of Materials*. Analysis of states of stress and strain; constitutive relations; equilibrium; and energy principles and methods. Applications to beam columns, beams on elastic foundations, curved beams, plates and shells, buckling. 3 units. *Dvorak and Hill*

CE 202. *Experimental Mechanics*. Experimental analysis of stress and strain; correlation of theory with experimental data; errors; photoelasticity; strain gages; brittle lacquers; similitude principles and design of models; and dynamic measurements. 3 units. *Hill and Wilson*

†CE 203. *Elastic Stability*. The concept of stability and its role in engineering applications. Specific topics include elastic columns with various end restraint; buckling of frameworks; rings and arches; lateral buckling of beams, buckling of thin plates and shells; utilization of energy theorems and calculus of variations; introduction to dynamic stability. 3 units. *Wilson*

†CE 204. *Plates and Shells*. Analysis of stress and deformation in plates; vibrations and buckling of plates. Membrane stress systems in shells; deformations of membrane shells. Introduction to bending theory of shells. Prerequisite: CE 201 or equivalent. 3 units. *Hill*

CE 205. *Elasticity*. Introduction to linear theory of elasticity; plane stress, plane strain, three-dimensional problems of torsion and bending; stress concentrations; torsion of thin-walled sections; complex potential representation. Prerequisite: CE 201 or equivalent. 3 units. *Dvorak, Hill, and Meriam*

CE 211. *Mechanical Behavior of Materials*. Micro versus macro aspects of materials; slip deformation; dislocations; general mechanical properties; fracture; simple and combined stress response; design with yield, fracture, creep, relaxation, fatigue, and impact considerations. 3 units. *Kumar*

*CE 212. *Structural Materials*. Fracture mechanics; viscoelastic, poly-

†Not offered in 1970-71.

*Offered on demand.

meric, and composite materials; strain rate behavior of materials; high velocity and hypervelocity impact. Prerequisite: CE 211. 3 units. *Dvorak and Kumar*

CE 221. *Incompressible Fluid Flow*. Steady and unsteady pipe flow, theories of turbulent flow; water hammer theory and control; surge tanks; air chambers; the analysis and control of fluid systems; effect of resistance; tapered conductors. 3 units. *Muga*

CE 222. *Open Channel Flow*. Basic principles. Selected flow problems and practical solutions; gutter and inlet flows, flow over spillways, and flow into estuaries and bays. Design of open channel structures, river hydraulics. Design of flood control and navigation structures; culverts, bridge openings, and energy dissipators. 3 units. *Muga*

†CE 223. *Flow Through Porous Media*. Theory of miscible and immiscible fluid displacement processes. Derivation and solution methods. Selected problems in stability, fingering and capillarity. Applications; saline water intrusion, secondary recovery processes, seepage through earthen dams, dewatering of construction sites, well point operation. 3 units. *Muga*

CE 224. *Coastal and Tidal Hydraulics*. Basic analytical concepts; wave phenomena, theory of surface water wave motion, wave modification, wave spectra. Selected problems; harbor seicheing, moorings, fenders, sand bypassing, breakwater and pier design. 3 units. *Muga*

CE 225. *Engineering Hydrology*. Study of processes governing the origin, distribution, depletion, and replenishment of water resources and application of this knowledge to the solution of water supply and drainage problems. Topics include the hydrologic cycle, hydrometeorology, precipitation, runoff, hydrograph analysis, evapotranspiration, infiltration, groundwater, runoff, stream flow groundwater recharge, and hydrologic measurements. 3 units. *Bryan and Muga*

CE 231. *Structural Engineering Analysis*. A study in depth of a number of "classical" topics in structural analysis, such as elastic arch design, plasticity and limit design, numerical and approximate methods of beam analysis and the application of the electronic digital computer to solutions of structural problems. 3 units. *Brown*

CE 232. *Reinforced Concrete Design*. A critical review of research related to the development of existing codes. Special attention is given to the consideration of temperature changes effects, shrinkage, plastic flow, bond, shear and diagonal tension. Two-way slabs and flat plates design. 3 units. *Brown*

†CE 233. *Prestressed Concrete Design*. A critical review of research and recent developments in prestressed concrete design. Prestressed tanks, beams and columns, partially prestressing and composite design. 3 units. *Brown*

†Not offered in 1970-71.

CE 234. *Structural Design in Metals*. Design of metal structures using both elastic and plastic theories. Application to plate girders, bridge trusses, and building frames. Interpretation and justification of building codes and specifications. Planning, preliminary design, and organization of design procedures. 3 units. *Palmer*

CE 235. *Foundation Engineering*. An introduction to methods of analysis, design and construction of foundations. Bearing capacity and settlement of shallow and deep foundations. Soil exploration; excavation and bracing; drainage and stabilization; underpinning. Foundation vibrations. 3 units. *Clough and Vesic*

†CE 236. *Earth Structures*. An introduction to methods of analysis, design and construction of earth structures, such as dams, embankments, cuts, canals, airfield and highway pavements. Selection of materials, soil compaction and stabilization. Theory of seepage, design of wells and drainage collectors. Slope stability and related problems. Theory of layered systems and pavement design procedures. 3 units. *Clough and Vesic*

CE 243, 244. *Sanitary Engineering Unit Operations and Process Design*. Fundamental bases for design of water and waste treatment systems, including transport, mixing, sedimentation and filtration, gas transfer, coagulation, and biotreatment processes. 6 units. *Bryan*

CE 250. *Engineering Analysis*. A study of selected engineering problems for which ideal mathematical models are formulated, usually in terms of differential equations; use of digital computers; application of infinite series, finite difference calculus, energy, and collocation methods; problem orientation; static and dynamic behavior of rods, beams, plates; diffusion; a research-oriented term paper. 3 units. *Wilson*

†CE 304. *Advanced Plates and Shells*. General theory of elastic shells; bending of circular cylindrical shells, shells of revolution; analytical solutions; simplified theories. Finite element and finite difference analysis of plates and shells; folded plates; design of plate and shell structures. Prerequisite: CE 204. 3 units. *Hill*

CE 305. *Advanced Elasticity*. Complex variable methods in theoretical elasticity; stress, displacement, and mixed boundary value problems in plane strain and longitudinal shear (antiplane strain); axial symmetry. Dynamic boundary value problems; moving loads, punches, and cracks. Prerequisite: CE 205, Math 286. 3 units. *Dvorak*

†CE 306. *Plasticity*. A study of the macroscopic state of stress and strain in plastically deformed materials; yield criteria; flow rules; slip line field theory and the solution of boundary value problems for metals and granular media; anisotropy. Prerequisite: CE 201. 3 units. *Dvorak and Wilson*

†CE 307. *Viscoelasticity*. Models and definitions of viscoelastic solids;

†Not offered in 1970-71.

viscoelastic functions and their interrelations. Waves, vibrations, and pulse propagation in viscoelastic rods and beams; correspondence principle. Buckling of columns, three-dimensional viscoelasticity; vibrations; quasi-static and dynamic boundary value problems. Measurement of viscoelastic properties. Prerequisite: CE 205 or equivalent. 3 units. *Dvorak*

CE 309. *Advanced Structural Dynamics*. Dynamic stability and the vibrations of discrete and continuous systems; conservative and non-conservative systems; parametric excitation; Lyapunov's theorems; random excitation. Prerequisite: ME 203. 3 units. *Wilson*

CE 321. *Mechanics of Ideal Fluids*. Basic equations of ideal fluid flow; potential and stream functions; vortex dynamics; body forces due to flow of fluids; methods of singularities in two-dimensional flows; analytical determination of potential functions; conformal transformations; free-streamline flows. Prerequisite: Mathematics 286 or equivalent. 3 units. *Muga*

CE 331, 332. *Advanced Structural Design and Analysis*. Analytical and behavior concepts of structural components as related to the design of structural systems; classical methods; numerical and approximate techniques; behavior of structural elements under static and dynamic loading; buckling behavior. Prerequisite: CE 231 or equivalent. 6 units. *Brown and Hill*

†CE 335. *Mechanical Behavior of Soils*. Origin of soils, soil minerals and processes of soil formation; physical chemistry of multiphase systems and soil structure. Permeability and flow of water through soils: capillary and osmotic phenomena; soil compressibility; theory of consolidation; shear strength and failure criteria. Stress-strain relationships, volume changes and pore pressures during shear, strength properties. Advanced laboratory soil testing techniques. 4 units. *Clough and Vesić*

†CE 336. *Advanced Soil Mechanics*. Theories of plastic and elastic equilibrium of soil masses and their application to analysis of problems such as: pressure on retaining walls, anchored bulkheads, cofferdams, silos, shafts, tunnels; stability of slopes; stresses and settlement in soil masses and pavement, piles and pile groups subjected to lateral loads. Prerequisite: CE 335. 4 units. *Vesić*

†CE 337. *Elements of Soil Dynamics*. Behavior of soils and foundations under transient and impact loads. Mechanics of pile driving. Foundation vibrations. Effects of explosions on soils: wave propagation, cratering. Earthquake effects on foundations, earth dams and slopes. Compaction of loose soils by explosives or by vibration. Behavior of layered systems under dynamic loads. Prerequisite: CE 335 or consent of instructor. 3 units. *Clough and Vesić*

CE 338. *Rock Mechanics*. Behavior and properties of rock as an engi-

†Not offered in 1970-71.

neering material; failure of rock. Design and construction of underground structures and slopes in rock; design of rock abutments for dams. Laboratory and field rock testing techniques. 4 units. *Clough*

CE 365. *Advanced Topics in Civil Engineering*. Opportunity for study of advanced subjects relating to programs within the Civil Engineering Department tailored to fit the requirements of a small group. 1 to 3 units. *Members of the Graduate Staff*

Electrical Engineering

Professor H. Owen, *Chairman* (130 Engineering); Professor Artley, *Director of Graduate Studies* (O4A Engineering); Professors Kerr, Meier, Pilkington, and Wilson; Associate Professors Hacker, Joines, Marinos, Nolte, Thurstone, and Wells; Assistant Professors George and Wang; Visiting Professor Trickey; Adjunct Associate Professor Burger

A student may specialize in any one of the following fields in working toward either the M.S. or the Ph.D. degree with a major in electrical engineering: solid-state materials and devices; ferromagnetics; superconducting circuits; instrumentation; electronics; microwaves; automatic control; energy conversion; digital systems; stochastic systems; information processing; and biomedical engineering.

A minimum prerequisite to the graduate courses in electrical engineering is a basic knowledge of differential equations, electric and magnetic field theory, and the theory of networks. A previous course in modern physics is recommended. There is no foreign language requirement. A qualifying examination is required for the Ph.D. program.

A program in stochastic system analysis is offered in cooperation with the Department of Mathematics at Duke and the Departments of Statistics and Mathematics at the University of North Carolina at Chapel Hill. For further details concerning this program, refer to the description under Special and Cooperative Programs.

For Seniors and Graduates

EE 203. *Random Signals and Noise*. Introduction to mathematical methods of describing and analyzing random signals and noise. Review of basic probability theory; joint, conditional, and marginal distributions random processes. Time and ensemble averages, correlation, and power spectra. Optimum linear smoothing and predicting filters. Introduction to optimum signal detection and parameter estimation, with applications such as radar. Selected laboratory work. (Fall semester.) 3 units *Owen and Kerr*

EE 204. *Information Theory and Communication Systems*. Information and entropy and their application in communication situations. Noise

†Not offered in 1970-71.

and channel capacity, coding, and the fundamental theorem of information theory. Continuous channels and transmission of band-limited signals. Comparisons of various practical modulation techniques from the standpoint of information rate and error probability. Prerequisite: EE 203. (Spring semesters 1970, 1972.) 3 units. *Nolte*

EE 205. *Signal Detection and Extraction Theory*. Fundamentals of signal detection theory and its application to radar, sonar, and communication systems. Design of optimum detectors for known signals, for signals with unknown parameters, and for signals transmitted through fading channels. Analysis and comparison of optimum noise immunity of practical amplitude, pulse, and frequency modulation systems. Prerequisite: EE 203 or permission of instructor. (Spring semesters 1971, 1973.) 3 units. *Nolte*

EE 207. *Theory and Design of Switching Networks*. Techniques for the analysis and design of combinational and sequential switching networks. Number systems; Boolean algebra and elements of code theory; minimization techniques; memory devices; static and dynamic hazards in logic networks. Selected laboratory work. Prerequisite: permission of instructor. (Fall semester.) 3 units. *George and Marinos*

EE 208. *Digital Computer Design*. Fundamentals of digital computer design. Digital arithmetic; hardware implementation of combinational and sequential logic circuits: adders, multipliers, switching matrices, shift registers, counters, comparators, and character generators. Detailed design of a simple digital computer system. Selected laboratory work. Prerequisite: EE 207 or permission of instructor. (Spring semesters 1971, 1973.) 3 units. *Marinos and Owen*

EE 211. *Solid State Theory*. The fundamental theory of wave motion in solids. Wave mechanics; variational methods; perturbation theory; many-electron problems; one-electron approximation; free-electron approximation; electron spin; Brillouin zones; time-dependent Schrödinger's equation; and transition probabilities. Introduction to thermostatics and statistical mechanics. Prerequisite: permission of instructor. (Fall semester.) 3 units. *Artley and Hacker*

EE 212. *Solid State Materials*. Concepts of solid state physics as applied to engineering materials; electric, magnetic, thermal, and mechanical properties of solids; dielectrics; semiconductors; magnetic materials; and superconductors. Selected laboratory work. Prerequisite: EE 211. (Spring semesters 1970, 1972.) 3 units. *Artley and Hacker*

EE 213. *Principles of Magnetism*. Classical field theory and quantum mechanical descriptions of magnetic properties of materials. Diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism, and ferrimagnetism. Resonance and relaxation in magnetic materials. Anisotropy, magnetostriction, domain theory and switching properties. Selected topics to related theory of magnetism to applications of engineering interest.

Prerequisite: EE 211 or permission of instructor. (Spring semesters 1971, 1973.) 3 units. *Artley and Hacker*

EE 215. *Semiconductor Physics*. A quantitative treatment of the physical processes that underlie semiconductor device operation. Topics include: Band theory and conduction phenomena equilibrium and non-equilibrium charge carrier densities; charge generation, injection, and recombination; drift and diffusion processes; low and high field conduction. Prerequisite: EE 211 or permission of instructor. 3 units. *Staff*

EE 217. *Masers*. Principles of masers, particularly optical masers. Discussion of quantum electronics, optical configuration; solid state, gaseous, and liquid devices; modulation; high power operation. Prerequisite: permission of instructor. Two class sessions and laboratory. (Spring semesters 1971, 1973.) 3 units. *George*

EE 222. *Nonlinear Analysis*. Introduction to methods of analyzing engineering systems described by nonlinear differential equations: analytic, numerical, graphical, and series approximation methods; analysis of singular points; stability of nonlinear systems. Applications of various methods, such as the modified Euler, Runge-Kutta, isoclines, perturbation, reversion, variation of parameters, residuals, harmonic balance, Bendixon, and Liapounov to phenomena of nonlinear resonance, subharmonics, relaxation oscillations, and forced oscillating systems. Prerequisite: permission of instructor. (Fall semester.) 3 units. *Wilson*

EE 225. *Semiconductor Electronic Circuits*. Analysis and design of electronic circuits utilizing a variety of static and dynamic models of semiconductor devices. Transistor and other semiconductor device circuit models; bias stability; high frequency and noise models switching characteristics; illustrative semiconductor circuits. Selected laboratory work. Prerequisite: permission of instructor. (Spring semester.) 3 units. *Owen and Joines*

EE 227. *Network Synthesis*. Linear network theory, including a review of time and frequency domain analysis; network graphs; network functions and realizability condition; driving point impedance synthesis of passive networks; driving point and transfer specifications; approximation methods. Prerequisite: permission of instructor. (Fall semesters 1970, 1971.) 3 units. *George and Marinos*

EE 241. *Linear Control Systems*. Theoretical and applied principles of design of linear, continuous-data control systems. Integration of system elements into a closed loop system. Stability from Routh, Nyquist and root locus viewpoints. Time and frequency domain methods. Performance improvement using compensation. Disturbances and multiple inputs. Two class sessions and one three-hour laboratory. Credit not given for both EE 199 and EE 241. Prerequisite: permission of instructor. (Fall semester.) 3 units. *Wells*

EE 243. *Advanced Linear Systems Theory*. Definition of a linear, dynamical system; mathematical preliminaries including set theory, linear

algebra, vector differential and difference equations; concepts of state space and state variables; state-model description, multivariate systems; the basic existence and uniqueness theorem, stability, transfer function, transition matrix and zero-state, zero-input responses of the system; concepts of reachability, controllability, observability and their practical implications. Transformation and equivalence of linear systems. Prerequisite: permission of instructor. (Fall semester.) 3 units. *Wang*

*EE 244. *Selected Topics in Control Systems*. Analysis and design of linear sampled-data systems using Z-transform and modified Nyquist approaches. Analysis of linear systems with statistical inputs and nonlinear systems using describing functions. Analog and digital computer techniques for the solution of appropriate problems. Prerequisites: EE 203 and either EE 199 or EE 241. 3 units. *Wells*

*EE 259. *Advanced Electric Energy Conversion*. Equations of motion of electromechanical systems; fields and lumped parameters, state function concepts; mathematical techniques for analyzing electromechanical devices and systems; transducers; unified treatment employing matrix, tensor, and block-diagram concepts to obtain response under static and dynamic conditions: the generalized rotating machine. Prerequisite: permission of instructor. 3 units. *Trickey*

EE 265. *Advanced Topics in Electrical Engineering*. Opportunity for study of advanced subjects related to programs within the Electrical Engineering Department tailored to fit the requirements of a small group. Prerequisite: approval of the Director of Graduate Studies and of instructor under whom work will be done. 1 to 3 units. *Staff*

EE 271. *Electromagnetic Theory*. The classical theory of Maxwell's equations; electrostatics, magnetostatics, boundary value problems including numerical solutions, currents and their interactions, force and energy relations. Prerequisite: permission of instructor. (Fall semester.) 3 units. *Joines*

EE 272. *Applications of Electromagnetic Theory*. Propagation of electromagnetic waves in various structures and media; mathematical description of microwave networks, including equivalent circuits and matrix methods; microwave circuit theorems and synthesis techniques. Selected laboratory experiments. Prerequisite: EE 271. (Spring semesters 1970, 1972.) 3 units. *Joines*

For Graduates

EE 304. *Advanced Statistical Analysis and System Design*. Advanced statistical techniques useful for analysis and design in both communication and control systems. Introduction to statistical decision theory, and design to minimize average risk. The Bayesian approach to parameter estimation, smoothing, prediction, and signal detection. Wiener-Kalman

*Offered on demand.

filters and their application to signal processing in control situations. Prerequisite: EE 203. (Spring semesters 1970, 1972.) 3 units. *Kerr*

EE 305. *Advanced Applications of Statistical Decision Theory*. Optimum modulators and demodulators, comparison of various systems, Gaussian signals in Gaussian noise; sonar-radar problem, representation of narrow band processes, slowly-fluctuating targets, optimum receiver for estimating range and Doppler, properties of autocorrelation functions and ambiguity functions, pseudo-random signals, resolution, frequency spreading, reverberation, active sonar, optimum space-time system, and passive sonar. Prerequisite: EE 205. (Fall semesters 1970, 1972.) 3 units. *Nolte*

EE 306. *Adaptive Detection and Communication Systems*. Sequential detection, Wald's sequential probability ratio test, sequential tests of composite hypotheses, deferred decision theory; adaptive systems, non-decision directed and decision-directed measurements, adaptive on-off communications system, transmitted reference systems, detection systems employing the learning feature, learning with and without a teacher, pattern recognition. Applications to communication systems. Prerequisite: EE 205. (Fall semesters 1971-1973.) 3 units. *Nolte*

EE 307. *Advanced Digital Systems I*. A unified treatment of finite-state deterministic systems. Models and elementary properties of sequential machines; sequential machine compatibility; equivalence and state minimization; state assignment for sequential machines; state and machine identification experiments; asynchronous and speed independent switching circuits; theory of regular expressions. Prerequisite: EE 207 or permission of instructor. (Fall semesters 1971, 1973.) 3 units. *Marinos*

EE 308. *Advanced Digital Systems II*. A continuation of EE 307. Machine decomposition; design of reliable systems from unreliable components; probabilistic and fuzzy automata; recognition devices; automata and their relation to context-free languages. Prerequisite: EE 307 or permission of instructor. (Spring semesters 1970, 1972.) 3 units. *Marinos*

*EE 311. *Quantum Theory of Materials*. Concepts of the quantum theory of solids as applied to engineering materials. Topics selected will vary with the interests of the class, but the importance of quantized fields in crystals (phonons, magnons, plasmons, excitons, and polarons) and the interaction of these fields will be stressed. Prerequisites: EE 211 and Physics 316. 3 units. *Pilkington*

EE 313. *Magnetic Processes in Materials*. Selected topics in magnetism. Cryomagnetism, spin wave resonance, interaction of superconductor and ferromagnetic materials, nonlinear spin wave theory, effects of finite dimensions and interfaces on basic properties of ferromagnets. Microwave applications. Prerequisite: EE 213 or permission of instructor. (Fall semesters 1971, 1973.) 3 units. *Artley and Hacker*

*Offered on demand.

*EE 315. *Semiconductor Devices*. Derivation of the d-c and incremental electrical characteristics of p-n junction and junction transistors; equivalent circuit models: parameter determination; implication and limitations of models for describing device operation; thermal runaway; avalanche device operation; thin film, multi-junction and other modern devices. Prerequisite: EE 215. 3 units. *Staff*

EE 321. *Nonlinear Magnetic and Semiconductor Circuits*. Mathematical description on nonlinear magnetic and semiconductor characteristics; transient and steady-state analysis and synthesis of nonlinear systems with application of such topics as magnetic amplifiers, frequency converters, oscillators, computer logic, switching devices, and inverters. Prerequisite: permission of instructor. (Spring semesters 1971, 1973.) 3 units. *Wilson*

EE 324. *Nonlinear Oscillations in Physical Systems*. Analysis of phenomena encountered in free and forced oscillating systems: stability criteria, topological methods, degenerate systems and discontinuous theories, relaxation oscillations, asymptotic approaches. Emphasis on interdependence of physical and mathematical reasoning in analyzing nonlinear electrical and mechanical systems. Illustrative examples selected to meet interest of class. Prerequisite: EE 222. (Spring semesters 1970, 1972.) 3 units. *Wilson*

EE 342. *Optimal Control Theory*. The maximum principle of Pontryagin and the Hamilton-Jacobi equation. Properties and design of optimal systems: minimum-time, -fuel, and -energy problems. Optimal linear systems with quadratic criteria. Classical variational theory: The Euler-Lagrange equation, two-point boundary value problems. The problem of Mayer and Bolza, Riccati matrix differential equation. Dynamic programming of Bellman: Multistage decision process, principle of optimality and properties of the optimal value function. Selected laboratory work. Prerequisite: EE 243. (Spring semesters 1971, 1973.) 3 units. *Wang*

EE 345. *Stochastic Control Systems*. Wiener process, Poisson's processes, Markov chains, Stochastic finite-state machines and semi-Markovian processes. Stochastic control systems, stability of stochastic systems. Mean square error analysis, Wiener filters, statistical equivalent linearization and identification of control systems by statistical techniques. Fixed-memory, expanding-memory, fading-memory filters and Kalman's filters. Stochastic dynamic programming and optimization of stochastic control systems. Prerequisites: EE 203 and EE 243. (Spring semesters 1970, 1972.) 3 units. *Wang*

EE 361, 362. *Electrical Engineering Seminar-Journal*. A weekly seminar in which graduate students and the faculty of Electrical Engineering meet to discuss research and professional activities. Although this carries

*Offered on demand.

no graduate credit, it is expected that each graduate student will participate in the seminar for at least two semesters while in residence at Duke University. *Artley*

EE 371. *Advanced Electromagnetic Theory*. An advanced treatment of topics in electromagnetic theory selected from the interests of the instructor and students. Representative topics are propagation in anisotropic media, plasma waves, antennas, and boundary value problems. Prerequisite: EE 272. (Fall semesters 1970, 1972.) 3 units. *Artley*

EE 373. *Selected Topics in Field Theory*. An advanced treatment of topics in generalized field theory selected from the interests of the instructor and the students. Representative topics are generalized fields, electromagnetic interactions, quantum electrodynamics, inhomogeneous media, and diffusion phenomena. Prerequisite: EE 272. (Spring semesters 1971, 1973.) 3 units. *Artley*

EE 399. *Special Readings in Electrical Engineering*. Special individual readings in a specified area of study in electrical engineering. Prerequisite: approval of the Director of Graduate Studies. 1 to 3 units. *Members of the Graduate Staff*

Mechanical Engineering

Professor Chaddock, *Chairman* (142A Engineering); Associate Professor Harman, *Director of Graduate Studies* (145 Engineering); Professors Kenyon, Linderoth, Macduff, Meriam, and Pearsall; Associate Professors Clark and Elsevier; Assistant Professors Buzzard, Shepard, Werner, and Wright; Adjunct Associate Professor Murray

Graduate study is available to students seeking the M.S. and Ph.D. degrees with a major in mechanical engineering. Emphasis is placed on advanced study, research, and design in three primary areas: thermal and fluid systems, design and control of machines and processes, and the development of materials. The department also participates in two interdisciplinary areas of graduate instruction and research, namely, biomedical and oceanographic engineering. The program includes opportunities for advanced experimental work as well as theoretical study. Special emphasis is offered in the particular areas of heat and mass transfer, thermodynamics, high-speed ground transportation, fluid mechanics, gas dynamics, vibrations, system response and control, refrigeration and cryogenics, nuclear engineering, mechanical design and the science of materials. Increasing emphasis is placed on developing the creative abilities of graduate students and on relating the work to the evolving needs of modern engineering practice.

ME 202. *Theoretical Thermodynamics*. Classical thermodynamics and thermodynamics of continuum properties for real substances, equilibrium, introduction to statistical thermodynamics. 3 units. *Harman*

ME 203. *Introduction to Advanced Mechanics*. A comprehensive introduction to advanced theory and application in advanced mechanics with emphasis on stability, space kinematics, and kinetics of particles and rigid bodies, generalized motion equations for constant and time-dependent mass systems, and generalized coordinates. 3 units. *Meriam and Wright*

*ME 211. *Theoretical and Applied Polymer Science*. An advanced course in materials science and engineering, dealing specifically with the structure and properties of polymers. Particular attention to recent developments in the processing and use of modern plastics and fibers. 3 units. *Clark and Pearsall*

ME 221. *Compressible Fluid Flow*. The concepts and analysis for flow of gases in subsonic to hypersonic regime. Two-dimensional flow; oblique shocks; experimental techniques. 3 units. *Harman and Buzzard*

ME 222. *Heat Transfer*. Steady-state and transient solutions of the general heat conduction equation. Development of the equations for transport of energy by fluid motion. Principle of similarity and dimensional analysis in convective energy transport. Solutions of the boundary layer equations. The laws of radiation heat transfer and radiation heat exchange. 3 units. *Chaddock and Werner*

ME 226. *Intermediate Fluid Mechanics*. A survey of the principal concepts and equations of fluid mechanics. Fluid properties. Statics. Basic equations for the control volume. The differential equations of fluid motion. Stream function. Irrotational flow. Navier-Stokes equations. Kelvin's and Crocco's theorem. Applications to two-dimensional incompressible potential flow and to viscous flow in boundary layers. Prerequisite: Egr 143. 3 units. *Buzzard and Werner*

ME 231. *Systems Response and Control*. Methods, applicable to design, of obtaining parameters for strength, response, and stability studies of mechanical systems. Analysis of closed loop control systems with linear transfer functions; electrical and mechanical analogs; introduction to determination of transfer function from input-output characteristics. 3 units. *Macduff and Wright*

*ME 233. *Fluid Control Systems*. A design-oriented course concerned with hydraulic and pneumatic feedback control systems. Basic control system characteristics; linearized transfer functions; determination of transfer function from computation and experiment; position, velocity, and acceleration feedback devices; transducers; DC and AC hydraulic and pneumatic amplifiers. 3 units. *Macduff*

ME 235. *Advanced Mechanical Vibrations*. Analytical and experimental procedures applied to design of machines and systems for adequate vibration control. Determination of eigenvalues and eigenvectors by iteration and computer techniques; transfer matrices applied to lumped and distributed systems; analytical and numerical methods of obtaining

*Offered on demand.

the pulse response of plane and three dimensional multi-mass systems; convolution and data processing; introduction to random vibration. 3 units. *Macduff*

*ME 251. *Refrigeration and Cryogenics*. Theory and experiment in the evaluation of the thermodynamic properties of refrigerants and cryogenic fluids. Thermodynamics of vapor compression, air cycle, absorption and thermoelectric refrigeration. Production of low and very low temperatures, helium liquifiers. Two-phase flow processes. Heat exchange for refrigeration and cryogenic transfer. 3 units. *Chaddock*

*ME 255. *Energy Conversion*. Principles, thermodynamics, and classification of energy conversion devices. Introduction to semi-conductors thermoelectric generators, photovoltaic generators, thermionic generators magnetohydrodynamic generators, fuel cells, and other energy conversion devices. 3 units. *Harman*

ME 265. *Advanced Topics in Mechanical Engineering*. Study of advanced subjects in Mechanical Engineering tailored to fit the requirements of a small group. Prerequisites: approval of the Director of Graduate Studies and the instructor under whom work will be done. 1 to 3 units. *Members of the Graduate Staff*

*ME 270. *Theory of Lubrication and Bearing Design*. A study and analysis of the theory of hydrodynamic and hydrostatic lubrication. An examination of dynamics of bearing loading, bearing design and materials. Properties of lubricants. Students will work on real bearing problems taken from industry, construction equipment, transportation and wherever relative motion is required between adjacent surfaces. 3 units *Linderoth*

ME 280. *Nuclear Reactor Power Cycles*. Basic reactor principles and types. Examination of most feasible thermodynamic cycles for use with both stationary and mobile power plants. Consideration of safety shielding, heat transfer, fluid flow and materials problems unique to reactor design. 3 units. *Kenyon*

*ME 302. *Advanced Thermodynamics*. Classical thermodynamics of inherently irreversible processes. Statistical thermodynamic analysis of properties of real substances and processes. Principles of general thermodynamics. 3 units. *Harman*

*ME 311. *Behavior of Crystalline Solids*. An advanced treatment of the dependence of structure on atomic bonding, and of properties on structure in crystalline solids. Crystal structures; phase diagrams and solid-state thermodynamics; physical properties; mechanical properties; kinetics of thermal treatments. 3 units. *Pearsall and Shepard*

*ME 322. *Mechanics of Viscous Fluids*. Equations of motion for a viscous fluid; general properties and selected solutions of the Navier-Stokes equations; laminar boundary layer equations with selected solutions and approximate techniques; origin of turbulence. 3 units. *Buzzard*

*Offered on demand.

*ME 323. *Convective Heat Transfer*. Models and equations for fluid motion, the general energy equation, and transport properties. Exact, approximate, and boundary layer solutions for laminar flow heat transfer problems. Use of the principle of similarity and analogy in the solution of turbulent flow heat transfer. Two-phase flow, nucleation, boiling, condensation, and simultaneous heat and mass transfer. Prerequisites: Math 285, ME 222 or equivalent. 3 units. *Chaddock*

*ME 372. *Finite Element Techniques in Design*. Finite element methods applied to design problems in stress analysis; temperature distribution; and flow problems. Derivation of state vectors and transfer matrices for rectangular and triangular elements; accuracy and computation methods; comparison with difference equation methods and available analytical results. 3 units. *Macduff*

*ME 399. *Special Readings in Mechanical Engineering*. Individual readings in advanced study and research areas of mechanical engineering. Prerequisite: approval of the Director of Graduate Studies. 1 to 3 units. *Members of the Graduate Faculty*

English

Professor Ferguson, *Chairman* (323 Allen Building); Professor Lievsay, *Director of Graduate Studies* (315 Allen Building); Professors Budd, Duffey, Gohdes, Nygard, Patton, Reiss, Sanders, Smith, Stevenson, Turner, and Williams; Associate Professors Anderson, Jones, Mellown, Monsman, Randall, and Strandberg; Assistant Professor Jackson

The department offers graduate work leading to the A.M., M.A.T., and Ph.D. degrees. A statement of the requirements for the Ph.D. degree may be obtained from the Director of Graduate Studies. The department requires a reading knowledge of one modern foreign language for the A.M. degree; for the Ph.D., two languages determined by the student's committee.

For Seniors and Graduates

207, 208. *History of the English Language*. A survey of the language from Old English to present-day English, taking into consideration developments in phonology, morphology, syntax, and vocabulary. 6 units. *Nygard and Reiss*

209. *Present-Day English*. A description of present-day American English from the point of view of modern linguistic theory; comparison of traditional and structural grammars; semantic change; the relation of the written to the spoken language; usage. 3 units. *Nygard and Reiss*

*Offered on demand.

210. *Old English Literary Tradition*. 3 units. *Nygard and Reiss*
212. *Middle English Literary Tradition*. 3 units. *Nygard and Reiss*
- 215, 216. *Chaucer*. Reading and interpretation of *The Canterbury Tales* in the first semester, of *Troilus and Criseyde* and the minor poems in the second. 6 units. *Nygard and Reiss*
221. *English Prose of the Sixteenth Century*. Readings in the major forms and authors. 3 units. *Lievsay*
222. *English Non-Dramatic Poetry of the Sixteenth Century*. Extensive select readings from representative types and authors, excluding Spenser. 3 units. *Lievsay*
223. *Spenser*. A study of his works. 3 units. *Lievsay*
224. *Shakespeare*. The plays and poems. 3 units. *Williams*
- 225, 226. *Tudor and Stuart Drama, 1500-1642*. The first semester includes Peele, Lyly, Greene, Kyd, Dekker, Heywood, Chapman, and Marston, with emphasis on Marlowe. The second semester, which emphasizes Jonson, is devoted also to Webster, Beaumont, Fletcher, Massinger, Middleton, Ford, and Shirley. 6 units. *Randall*
- 229, 230. *English Literature of the Seventeenth Century*. Major works in prose and poetry from 1600 to the death of Dryden. 6 units. *Lievsay, Williams (229), Randall (229), and Jackson (230)*
232. *Milton*. Milton's poetry and prose, with emphasis on the major poems. 3 units. *Lievsay*
234. *English Drama, 1642-1800*. The heroic play and the comedy of manners of the Restoration; the important plays, serious and comic, of the eighteenth century. 3 units.
- 235, 236. *The Eighteenth Century*. Swift, Pope, Defoe, Addison, Steele, and others are studied in the first semester; in the second, Gray, Johnson, Boswell, Collins, Goldsmith, the novelists, and other writers. 6 units. *Ferguson*
- 241, 242. *English Literature of the Early Nineteenth Century*. Wordsworth, Coleridge, Scott, Byron, Shelley, Keats, Lamb, Hazlitt, and other writers. 6 units. *Patton, Sanders, and Stevenson*
- 245, 246. *English Literature of the Later Nineteenth Century*. The first semester is devoted chiefly to Carlyle, Dickens, Thackeray, Tennyson and Browning; the second semester to Arnold, Ruskin, Pater, George Eliot, Meredith, the Pre-Raphaelites, and Swinburne. 6 units. *Sanders and Stevenson*
- 251, 252. *English Literature of the Twentieth Century*. Representative work of leading writers from 1900 to 1950, in fiction, drama, and poetry. The first semester will include Shaw, Conrad, Yeats, Wells, Bennett, Galsworthy, Ford, Synge, Forster, and Lawrence; the second semester Joyce, Woolf, Edith Sitwell, Eliot, Huxley, Graves, Bowen, Auden, and Dylan Thomas. Critical analysis of selected texts, with discussion of techniques and ideas. 6 units. *Smith and Mellow*
- 263, 264. *American Literature, 1800-1865*. The writers emphasized in

the first semester are Emerson, Thoreau, and Hawthorne; in the second semester, Poe and Melville. 6 units. *Budd, Jones, and Turner*

267, 268. *American Literature, 1865-1910*. Selected works of representative authors of the period. The first semester will include Whitman, Lanier, Mark Twain, James, Howells, Emily Dickinson, Henry Adams, and the Local Colorists; the second semester, Crane, Norris, Moody, London, Dreiser, Edith Wharton, Willa Cather, O'Neill, Robinson, and Frost. The lectures will deal primarily with literary trends as shaped by the social background. 6 units. *Budd and Gohdes*

270, 271. *Southern Literature*. The principal authors and the chief literary development from the beginning to the present. Emphasis in the first semester is on Byrd, Kennedy, Simms, Poe, Timrod, and the humorists; in the second on Lanier, Harris, Cable, Mark Twain, Ellen Glasgow, and Faulkner. Attention is given to the historical and cultural background and to literary relations extending outside the region. 6 units. *Turner*

275, 276. *American Literature Since 1910*. First semester, selected fiction from Gertrude Stein to the present. Second semester, poetry from the Imagist movement to the present. 6 units. *Duffey and Strandberg*

277. *Major Developments in Contemporary American Poetry*. The principal contributions to modern poetry made by American poets, including imagism and the new poetry; Eliot, Stevens, the "Fugitives," and a selection from the poets of the present generation. 3 units.

280. *Introduction to Folklore*. A survey of the materials of popular tradition, the folksong, the folktale, the proverb, the riddle, and other forms; the methods of folklore investigation; and the relation of these popular genres to literary tradition. 3 units. *Nygard*

285. *Literary Criticism*. A study of the Greek and Roman critics, in chronological order but with emphasis on their permanent value rather than on the mere history; also of the Continental and English critics to about 1700. 3 units. *Lievsay*

287. *Recent Critical Thought*. A survey of ideas relevant to the development of modern literature and its cultural relations. 3 units. *Duffey*

289. *Literary Biography*. Reading and discussion of works by Plutarch, Roper, Walton, Aubrey, Mason, Johnson, Boswell, Lockhart, Carlyle, Froude, Gosse, and Strachey: the development of the literary form, its various methods, and various theories of its nature and purpose. 3 units. *Sanders*

For Graduates

310. *Beowulf*. Reading and interpretation of the text. 3 units. *Nygard*

312. *Studies in Middle English Literature*. The literature of England from 1100 to 1500 (excluding Chaucer); a study of medieval genres with a close reading of selected major works. 3 units. *Nygard and Reiss*

315. *Studies in Chaucer*. Cultural background, sources, themes, structures; special attention to *Troilus* and the dream-vision poems. 3 units. *Nygard and Reiss*

318. *Medieval Romances*. Origins, types, forms, themes; special attention to Arthurian materials. 3 units.

320. *Studies in Renaissance English Prose*. Close readings in various forms and authors as they reflect the culture and thought of the Renaissance. 3 units. *Lievsay*

324. *Studies in Shakespeare*. Intensive study of carefully limited topics, together with critical analysis and interpretation of selected texts. 3 units. *Williams*

329. *Studies in the Metaphysical Poets*. A careful study of Donne, Herbert, and Vaughan against the seventeenth-century background, with some attention to their influence on other writers in the period and their impact on twentieth-century poetry. 3 units. *Lievsay*

330. *Studies in Dryden and His Age*. The early poems, the important odes, the religious and political poems, selected critical and controversial prose, and the heroic play and tragedy. 3 units.

337. *Studies in Swift*. Intensive study of the major prose; selected readings in the verse, political writings, and miscellaneous prose. 3 units. *Ferguson*

338. *Samuel Johnson's Literary Criticism and Related Topics*. 3 units. *Ferguson*

339. *The Eighteenth-Century Novel*. Richardson, Fielding, Smollett, and Sterne are emphasized. Attention is given to earlier prose fiction and to other contributing literary patterns. 3 units.

341. *Studies in English Romanticism*. 3 units.

343. *Studies in the Critical and Philosophical Ideas of Coleridge and Carlyle*. 3 units. *Sanders*

347. *Studies in Victorian Poetry*. Analysis of themes, forms, and sources in the works of Tennyson, Browning, Arnold, Rossetti, Swinburne, Meredith, Hardy, and Hopkins. 3 units. *Stevenson*

348. *Studies in Victorian Fiction*. Techniques and principal types of material in the novels of Dickens, Thackeray, Trollope, Eliot, Meredith, and Hardy. 3 units. *Stevenson*

349. *Studies in Nineteenth-Century Nonfictional Prose*. 3 units. *Sanders*

353. *Studies in British Poetry of the Twentieth Century*. Detailed examination of major poetic texts, with background readings in prose. 3 units. *Smith*

360. *Bibliography and Methods of Research in American Literature*. Bibliographical aids in criticism, historiography, and the comparative aspects of the literature and ideology of the United States will be discussed, and exercises will be conducted in such procedures as editing manuscripts, collating literary texts, writing scholarly book reviews, and

the mechanics of master's essays and doctoral dissertations. 3 units. *Gohdes*

364. *Hawthorne and Melville*. Extensive reading in the works of Hawthorne and Melville, and close study of selected writings. 3 units. *Turner*

365. *Emerson*. A study of Emerson's ideas as reflected in selected examples of his essays and poems. 3 units. *Gohdes*

366. *Whitman*. A detailed study of *Leaves of Grass* and of selected prose works. 3 units. *Gohdes*

368. *Studies in American Realistic Fiction*. Intensive study of a post-Civil War novelist such as Howells, with lesser attention to a representative precursor such as De Forest, and a twentieth-century writer such as Dreiser. 3 units. *Budd*

369. *Studies in American Humor*. The native tradition in the Down-East humorists and the humorists of the Old Southwest, in Mark Twain and his contemporaries, and afterward. 3 units. *Turner*

376. *Studies in Twentieth-Century American Literature*. Selected problems posed by the poetry, prose, fiction, or drama of this century. 3 units. *Duffey and Gohdes*

380. *The Traditional Ballad and Folksong*. Studies in English, Scottish, and American popular poetry, with attention to the textual and musical traditions. (No technical knowledge of music is required.) 3 units. *Nygard*

†382. *Paleography*. Textual criticism of medieval and Renaissance handwritten documents. 3 units.

383. *Textual Criticism*. The principles of analytical bibliography and their application to problems and procedures in the study of Elizabethan printed books. 3 units. *Williams*

100. *English for Foreign Students*. A non-credit semester course in English for foreign students. Restricted to registered undergraduate and graduate foreign students and, to capacity, to employees and wives of foreign students. Without fee for registered students who are permitted an audit without fee; otherwise a \$5.00 fee.

Forestry

Professor Ralston, *Dean* (213 Biological Sciences Building); Associate Professor Knoerr, *Director of Graduate Studies* (308 Biological Sciences Building); Professors Anderson, Barnes, Harrar, Hellmers, and Kramer; Associate Professors Slinn, Stambaugh, and Yandle; Adjunct Associate Professor Vukovich; Assistant Professor Chapman

Major and minor work is offered in the natural and social scientific aspects of forestry and related areas of natural resources leading to the

†Not offered in 1970-71.

Master of Arts, Master of Science, and Doctor of Philosophy degrees. Work for these degrees may be pursued in the biological science areas of dendrology and wood anatomy, forest ecology, tree physiology and biochemistry, forest pathology, and forest entomology; in the environmental science areas of forest soils, meteorology, and hydrology; in resource economics and policy; and in forest mensuration, biometry, and operations research. College graduates who have had specialized training in professional forestry or the related basic areas of the natural or social sciences may be considered for admission. Students may be restricted to the particular fields of specialization for which their academic background qualifies them. For information on professional training in forestry see the *Bulletin of the School of Forestry*.

The specific degrees available in forestry and related natural resources through the Graduate School are: the Master of Arts (with or without a thesis), Master of Science (with a thesis), and the Doctor of Philosophy degrees. Students majoring in forestry must demonstrate satisfactory knowledge of one foreign language as part of his requirements for both the Master of Arts and Doctor of Philosophy degrees. More information on degree and language requirements can be found in the degree requirements section of this *Bulletin*.

Biological Science

Dendrology and Wood Anatomy

241. *Dendrology*. Nomenclature, classification, and identification of woody plants with special reference to the tree species indigenous to southeastern United States and other important forest regions of temperate North America. Prerequisites: Biology 1-2 or equivalent. 3 units. *Harrar*

290. *Wood Anatomy*. Study of the physical features and the gross and minute structural characteristics of wood leading to the identification of the commercial woods of the United States, and the important tropical woods used in American wood-working industries. Elementary microtechnique. Prerequisites: one year of biology, Forestry 241, or equivalent. 3 units. *Harrar*

292. *Microtechnique of Woody Tissue*. Preparation of wood for microscopic study including sectioning, staining, and mounting techniques; elementary photomicrography. Prerequisites: Forestry 241 and 290 or equivalent. 3 units. *Harrar*

398. *Timbers of the World*. A study of the properties of various groups of tropical and temperate zone woods with particular emphasis upon those used in marine construction, and for lumber, plywood decorative paneling, and furniture. Prerequisite: Forestry 290 or equivalent. 2 units. *Harrar*

Ecology

243. *Forest Ecology*. Ecological foundations of silviculture with special reference to forest site factors; influence of forests on their environment; growth and development of trees and stands; origin, development, and classification of forest communities; methods of studying forest environments. Desirable prerequisites: plant physiology, plant ecology, and Forestry 261, or equivalents. 3 units. *Staff*

247. *Biological Nucleonics*. Fundamentals of nucleonics; instruction in biological uses of radioactive tracers, in counting instruments and measurements, and in legal requirements. Prerequisites: consent of the instructor and one year each of college biology, chemistry, and physics. (Listed also as Zoology 247.) 3 units. *Barnes and Fluke (Zoology)*

347, 348. *Forest Ecology Seminar*. Advanced topics in forest ecology are discussed and current research papers and reports are reviewed, analyzed, and evaluated. Prerequisite: Forestry 243 or equivalent. 2 units. *Staff*

Physiology and Biochemistry

201. *Tree Physiology*. A general survey of the major physiological processes in trees and other plants, including food synthesis, growth and water relations. Special project and term paper required. Lectures, laboratories, and readings. Prerequisite: permission of instructor. (Listed also as Botany 251.) 3 units. *Hellmers*

207. *Chemistry of Woody Tissues*. Composition of wood at the elemental, molecular, and macromolecular levels; both in woody plants and in processed woods. Distribution and properties of main components, and methods of analysis. Prerequisite: organic chemistry or consent of instructor. 3 units. *Barnes*

208. *Physiology of Wood Formation*. Processes involved in the growth and development of woody tissues, including internal control mechanisms and effects of environmental stresses on structure and composition. Prerequisite: Forestry 201 and 241 or equivalents. 3 units. *Barnes*

305. *Forest Tree Biochemistry*. Study of the biological synthesis, function, and degradation of the main biochemical constituents of trees. Emphasis on cellulose and other cell-wall polysaccharides, lignins, terpenes, and phenolics and other extractives. Prerequisites: Forestry 201 and a course in biochemistry. 3 units. *Barnes*

Pathology

222. *Biology of Forest Insects and Diseases*. Fundamentals of entomology and plant pathology as applied to forest protection; coordinated laboratory work with emphasis on identification and interpretation of forest and wood degradation. 4 units. *Anderson and Stambaugh*

223. *Forest Pathology*. Infectious and non-infectious diseases of forest trees, and related deterioration of forest products. Field and laboratory study of symptoms, etiology, and control. Prerequisites: Biology 11 and 12 or equivalent. 3 units. *Stambaugh*

321. *Phytopathological Technique in Forestry*. Fundamentals of phytopathology and their application to field and laboratory investigations of tree diseases and wood degradation; biological interpretation of host-pathogen-environment interaction is stressed in literature review, experimentation, and scientific writing. Prerequisite: Forestry 223 or equivalent. 4 units. *Stambaugh*

322. *Microbiology of Forest Soils*. Qualitative and quantitative characterization of the microbial populations of forest soils with emphasis on rhizosphere interactions in root pathogenesis and mycorrhizal development; epidemiology of root diseases of trees; principles of control. Prerequisites: Forestry 223, and mycology or bacteriology is recommended. 3 units. *Stambaugh*

385. *Seminar in Forest Protection*. Discussion of current problems in entomology and pathology and evaluation of topical research for protection and control application in forest resource management. Prerequisites: Forestry 223 and 230. 1 unit. *Anderson and Stambaugh*

Entomology

222. *Biology of Forest Insects and Diseases*. (See description under Pathology above.)

230. *Forest Entomology*. Identification, biology, and control of insects that cause damage to trees and wood products. Emphasis of diagnosis is on the characteristics of the damage and the stages of the insects responsible. Prerequisite: Forestry 222 or equivalent or consent of instructor. 3 units. *Anderson*

233. *General Entomology*. Principles of morphology, physiology, metamorphosis, and taxonomy of insects. Prerequisite: one course in entomology or zoology or consent of the instructor. 4 units. *Anderson*

†331. *Toxicology of Insecticides*. Study of the physical, chemical, and biological properties of materials used to destroy insects. Formulation, toxicology, and insect physiology as related to insecticide action are emphasized. Prerequisite: one course in entomology; organic chemistry is recommended. 3 units. *Anderson*

332. *Ecology of Forest Insects*. The influence of environmental factors on the vital processes of insects with emphasis on how both the abiotic and biotic elements influence the fluctuation of forest insect populations. Prerequisite: one course in entomology or zoology or consent of the instructor. 3 units, 4 units with laboratory. *Anderson*

335. *Entomological Research Techniques*. Problem analyses, scientific

†Not offered in 1970-71.

writing, and laboratory and field research methods which are especially applicable to entomological problems. 1 unit. *Anderson*

385. *Seminar in Forest Protection*. (See description under Pathology above.)

Environmental Science

309, 310. *Environmental Seminar*. Discussion of advanced topics and current research in the physical and chemical processes of the natural environment (air, soil, and water). Emphasis is placed on the interaction between environmental processes and living organisms. Prerequisite: consent of instructor. 1 unit. *Ralston and Knoerr*

Soils

261. *Forest Soils*. Origin, development, and classification of soils with special emphasis on those developed in humid climates; morphological, physical, and chemical properties of soils in relation to growth of trees; effect of forests on soils. Prerequisites: Chemistry 1 and 2, and Physics 1, or equivalents; physical geology, mineralogy, petrology, and analytical chemistry are also desirable. 3 units. *Ralston*

†362. *Forest Soil Physics*. Analysis of the physical properties of soil related to the growth and development of forest trees. Consideration is given to the significance of soil moisture, temperature, aeration, and structural characteristics in the analysis of forest growth relationships. Prerequisite: Forest 261. 3 units. *Ralston*

364. *Soil Classification and Mapping*. Classification of soils as natural bodies. Mapping of soils, land use classes, and forest site classes; field study will be made of soils in either the coastal plain or mountains. Prerequisite: Forestry 261. 3 units. *Ralston*

366. *Forest Soil Fertility*. The relationships of soil fertility factors in the growth of forest trees. Emphasis is placed on the analysis of soil factors related to the mineral nutrition of trees. Prerequisite: Forestry 262; analytical chemistry is recommended. 3 units. *Ralston*

Meteorology

203. *General Meteorology*. A general introduction to the science of meteorology, particularly for students concerned with problems in biology and hydrology. Emphasis is placed on the fundamentals and role of atmospheric thermodynamics and energy and mass transfer processes in determining both local and regional aspects of weather and climate. 3 units. *Knoerr*

304. *Atmospheric Turbulence and Diffusion*. Bulk and molecular as-

†Not offered in 1970-71.

pects of atmospheric turbulence. Navier-Stokes equations and the Reynold's stresses. Mixing-length and statistical turbulence theories. Similarity hypotheses. Turbulent transfer and diffusion in adiabatic and diabatic atmospheres. Characteristics of turbulence in various scales of motion from the planetary to sub-inertial range. Prerequisites: Forestry 203 and differential equations or consent of instructor. 3 units. *Vukovich*

†306. *Dynamics of Local Atmospheric Motion*. Characteristics of atmospheric motion in the 100 m to 100 km scale. Analytic development from hydrodynamic and thermodynamic equations, incorporating appropriate scale forcing functions of heating and terrain roughness. Theory and characteristics of land and sea breezes, mountain and valley breezes, mountain waves and local modification of large scale atmospheric motion. Prerequisites: Forestry 203 and differential equations or consent of instructor. 3 units. *Vukovich*

†308. *Topics in Biometeorology*. The effect of meteorological processes on biological processes including; photosynthesis, respiration, gas diffusion, energy and water balance, seed dispersal, dissemination of pathogens, insect migration, and effects of atmospheric pollution. Prerequisites: Forestry 203 or equivalent and permission of instructor. 3 units. *Knoerr and Barnes*

344. *Micrometeorology*. Physics of the earth's surface environment with emphasis on plant and animal microclimates: budgets of mass, momentum and energy; vertical structure of wind, temperature, water vapor and carbon-dioxide in relation to exchange processes within the biosphere; local circulation and eddy diffusion; principles of micrometeorological measurement. Prerequisite: Forestry 203 or equivalent, calculus. 3 units. *Knoerr*

Hydrology

342. *Hydrologic Processes*. Physical processes of the hydrologic cycle with emphasis on those processes which can be modified or controlled by watershed management. 3 units. *Knoerr*

Resource Economics and Policy

269. *Resource Economics and Policy*. Development and critical review of concepts useful in understanding and evaluating the distribution of natural resource use over time in terms of the relations between technological knowledge, group and individual behavior, and social institutions. 3 units. *Slinn*

270. *Economics of Forestry*. Development of the principles of economics useful in the analysis of the past, present, and prospective supply and demand situations for forestry goods and services; problems of the

†Not offered in 1970-71.

economics of the firm and industry, basic and peculiar to forestry, with special attention to the time dimensions of value; the role of forestry in the general economy including attention to relevant institutional factors. Prerequisite: Forestry 269 or one course in the principles of economics. 3 units. *Slinn*

377. *Seminar in Natural Resource Allocation and Efficiency*. Evaluation of economic principles concerned with problems of natural resource allocation, with special attention to the alternatives for governmental policies in private property economies. Prerequisite: an advanced level course in non-market decision-making or Forestry 378 or its equivalent. 2 units. *Slinn*

378. *Seminar in Forest Economics*. Examination and discussion of the application of economic concepts in forestry, the potential contribution of economic analysis to private and public forest management; current research in forest economics. Prerequisites: Forestry 270 and 379 or consent of the instructor; advanced courses in economics and economic theory are desirable. 2 units. *Slinn*

Statistics and Operations Research

210. *Analytical Techniques in Forest Utilization*. Introduction to utilization in the managed forest and principal wood-using industries and to operations analysis methods applied to scheduling and production problems in these industries. 3 units. *Yandle*

250. *Biometry*. Concepts and methods of statistics essential to the collection, analysis and interpretation of resource and biological data. Emphasis is placed on problems of estimation, inference, and decision-making with experimental data. 3 units. *Yandle*

251. *Theory and Methods for Sampling Biological Populations*. Introductions to statistical methods for sampling natural resources and biological populations. Simultaneous consideration is given to theoretical and experimental problems in the design and applications of sampling methods and in the interpretation of sample data. Prerequisite: Forestry 250 or consent of instructor. 3 units. *Yandle*

253. *Computer Science in Natural Resources*. Components and organization of a computer system; automatic programming languages; storage and retrieval systems (TSAR); equation fitting by iteration and least squares methods; graphical techniques. 1 unit. *Staff*

258. *Operations Research*. Mathematical model formulation and development of techniques to aid decision-making in problems of natural resource allocation and use. Includes the theory and techniques of inventory control, equipment replacement planning, queuing theory, competitive strategies, allocation, sequencing and dynamic programming. Consideration is given to both deterministic and nondeterministic models. 3 units. *Staff*

352. *Theory and Applications of Linear Statistical Models*. Theoretical development of the general linear statistical model together with extensions to accommodate linear approximation of non-linear cases. Curve fitting techniques are developed with emphasis on applications to natural phenomena. Prerequisite: consent of the instructor. 3 units. *Chapman*

353. *Design and Analysis of Experiments*. Extension of the theory of estimation and testing for general linear models to include the less than full rank case. Experimental design models such as factorial and incomplete block models are developed as special cases of the general theory. Emphasis is placed on field and laboratory designs together with appropriate computerized analysis techniques. Prerequisite: Forestry 352. 3 units. *Chapman*

Special Studies and Research

299. *Special Studies in Forestry*. Work on the senior-graduate level to meet the needs of individual students offered in the areas of forestry and related natural resources designated under Forestry 357, 358. Credits and hours to be arranged. *Staff*

301, 302. *Advanced Studies in Forestry*. Work on the advanced graduate level to meet the needs of individual students offered in the areas of forestry and related natural resources designated under Forestry 357, 358. Credits and hours to be arranged. *Staff*

357, 358. *Research in Forestry*. Students with adequate training may undertake special research problems under direction of members of the faculty in the following branches of forestry and related natural resources. Credits to be arranged.

1. *Forest Ecology*. Prerequisite: Forestry 243 or equivalent. *Staff*
2. *Forest Soils*. Prerequisite: Forestry 261 or equivalent. *Ralston*
5. *Forest Economics*. Prerequisite: Forestry 270 or equivalent. *Slinn*
6. *Wood Anatomy and Properties*. Prerequisites: Forestry 241 and 290 or equivalents. *Harrar*
7. *Forest Mensuration and Biometry*. Prerequisites: Forestry 250 and 352 or equivalents. *Yandle and Chapman*
8. *Forest Entomology*. Prerequisite: Forestry 230 or equivalent. *Anderson*
9. *Forest Operations Research*. Prerequisite: consent of instructor. *Yandle and Chapman*
10. *Dendrology*. Prerequisite: Forestry 241 or equivalent. *Harrar*
11. *Forest-Tree Physiology*. Prerequisites: plant physiology and plant or forest ecology. *Kramer, Hellmers, and Barnes*
12. *Forest Pathology*. Prerequisites: plant physiology and Forestry 223 or equivalents. *Stambaugh*
13. *Forest Meteorology and Hydrology*. Prerequisites: Forestry 203, 342, or equivalents. *Knoerr*

14. *Forest Biochemistry*. Prerequisites: plant physiology and organic chemistry. *Barnes*

368. *Field Seminars*. Field studies, consultations, and visits to areas of interest during spring vacation period, or at other times, in the several branches of forestry and related natural resources listed under Forestry 357, 358. Credits to be arranged. *Staff*

Related Courses in Other Departments

Many courses available in other departments of the university are related to the biological, environmental, economics and policy, and biometrics and operations research areas of forestry and other natural resources. These courses offered in botany, zoology, biochemistry, chemistry, physics, engineering, mathematics, economics, business administration, sociology, and political science may be utilized by graduate students in the School of Forestry. For a specific listing of pertinent courses available in other departments see the *Bulletin of the School of Forestry*.

The University Program in Genetics

Professor Gross, *Director* (on leave 1969-70); Associate Professor Ward, *Director* (1969-70); Professors Buettner-Janusch (Anatomy and Zoology), Gross (Biochemistry), Guild (Biochemistry), and Perry (Botany); Associate Professors Gillham (Zoology) and Ward (Zoology); Assistant Professors Boynton (Botany), Counce (Anatomy), Hall (Biochemistry), Harriman (Biochemistry), Kelley (Biochemistry and Medicine), and Kredich (Biochemistry and Medicine)

The University Program in Genetics provides a coherent course of study in all facets of biology related to genetics. Graduate students registered in any of the biological sciences departments may apply to the faculty of the genetics program to pursue study and research leading to an advanced degree. It would be helpful if applicants for admission to the Graduate School indicated their interest in the genetics program at the time of application. Requests for information describing more completely the research interests of the staff, facilities and special stipends and fellowships should be addressed to the Director, Genetics Program (Nanaline H. Duke Building 151).

For Seniors and Graduates

204. *Introductory Genetics*. An introduction to genetic analysis with emphasis on the molecular basis of mutation, segregation, function, and organization of the genetic material. Primarily for medical students but

graduate students may be admitted with the instructor's permission. (Listed as Biochemistry 204.) 2 units. *Gross and Staff*

232. *Human Genetics*. Particular emphasis upon the uniqueness of studies in human genetics, human biochemical genetics, human population genetics. Prerequisites: Anatomy 231, Zoology 131 (or an elementary course in biology including genetics), or permission of instructor. (Listed as Anatomy 232 and Zoology 232.) 3 units. *Buettner-Janusch*

280. *Principles of Genetics*. An introduction to the structure and properties of genes and chromosomes and to the evolution of genetic systems. Prerequisites: introductory courses in biology, chemistry, and mathematics. (Listed as Botany 280 and Zoology 280.) 3 units. *Boyn-ton, Gillham, and Staff*

282. *Experimental Genetics*. A series of laboratory exercises and discussions on the molecular mechanisms of mutation, recombination, replication, transcription, and translation of the genetic material. May be taken concurrently with Genetics 280. Prerequisite: consent of instructor. (Listed as Biochemistry 282.) 2 units. *Hall, Harriman, and Staff*

288. *The Cell in Development and Heredity*. A seminar on topics of current interest and controversy. (Alternates with Zoology 244.) Pre-requisite: a course in genetics and permission of one instructor. (Listed as Anatomy 288 and Zoology 288.) 2 units. *Counce, Gillham, and Staff*

For Graduates

315. *Molecular Genetics*. An advanced course on genetic mechanisms and their relationship to nucleic acids. Prerequisites: introductory courses in biochemistry and genetics. (Listed as Biochemistry 315.) 3 units. *Guild and Staff*

351-352. *Genetics Seminar*. Required of all students specializing in genetics. (Listed as Biochemistry 351-352.) 1 unit each semester. *Gross and Staff*

383. *Current Topics in Developmental Genetics and Cytogenetics*. A seminar and lecture course devoted to the analysis of the current literature in developmental genetics and cytogenetics. Given in response to adequate demand. Prerequisites: Genetics 280 or its equivalent and consent of the instructor. (Listed as Botany 383.) 1 unit. *Boyn-ton and Staff*

384. *Current Topics in Genetic Mechanisms*. A seminar and lecture course devoted to the analysis of current publications on molecular genetics. Given in response to adequate demand. Prerequisites: Genetics 280 or its equivalent and consent of the instructor. (Listed as Biochem-istry 384.) 1 unit. *Hall and Staff*

385. *Current Topics in Population Genetics and Evolution*. A seminar and lecture course devoted to the analysis of the current literature in population genetics and evolution. Given in response to adequate

demand. Prerequisites: Genetics 280 or its equivalent and consent of the instructor. (Listed as Zoology 385.) *Ward and Staff*

Geology

Associate Professor Heron, *Chairman* (119 Science Building); Associate Professor Pilkey, *Director of Graduate Studies* (05 Science Building); Associate Professors Furbish and Perkins; Assistant Professor Lynts

The Department of Geology offers graduate work leading to the A.M. degree. An undergraduate degree in geology is not a prerequisite for graduate studies, but a student must have had or must take a summer field geology course (or equivalent experience), mineralogy, sedimentary rocks, stratigraphy, paleontology, and structural geology. In addition he must have had one year of college chemistry, one year of college physics, and mathematics through calculus.

Graduate courses in the Department of Geology are designed to provide training in the field of environmental geology with specialized training in oceanography, sedimentology, and paleontology.

An acceptable thesis is required. There is no language requirement for the A.M. degree.

For Seniors and Graduates

*200. *Field Methods in Physical and Geological Oceanography*. Survey course of modern oceanographic sampling techniques for fauna, sediments, sedimentary structures, and water characteristics. 2 units. *Lynts, Perkins, and Pilkey*

204. *Physical Oceanography*. A study of the physical processes affecting the oceans, including the physical properties of sea water, ocean's heat budget, basic dynamics of ocean movement, major current systems, water masses, and waves and tides. Laboratory and field work include collection of physical oceanographic data, use of basic instrumentation, and solution of problems. Prerequisites: one year of physics, chemistry, calculus, and a general oceanography course or permission of instructor. (Given at Beaufort only.) 6 units. *Staff*

205. *Geological Oceanography*. The study of the broad geologic aspects of the ocean basins, including origin, bottom physiography, sediment distribution and sedimentary processes. Observations in the field will be emphasized and will include training in sampling procedures for both shallow and deep water. This course is not open to students who have completed Geology 206. (Given at Beaufort only.) 6 units. *Pilkey*

*Offered on demand.

206. *Principles of Geological Oceanography*. A broad survey of many geological aspects of the oceans including sediment types, processes of sedimentation, geological structures of the ocean basins, and bottom physiography. Prerequisites: Geology 213 or consent of instructor. 3 units. *Pilkey*

208. *Shallow-Marine Geology*. A survey of the physical and biological processes responsible for sediment production, accumulation and alteration in the shallow-marine environment. Interplay between sediments and organisms in modern carbonate environments will be emphasized. Environments discussed range from shelf-margin coral reefs to supratidal mud flats. Prerequisite: Geology 108 or consent of instructor. 3 units. *Perkins*

211. *Stratigraphic Principles and Applications*. Survey of stratigraphic principles with an emphasis on their application to the solution of stratigraphic problems. Discussions of case histories from the literature. Prerequisites: Geology 108. 3 units. *Perkins*

213. *Sedimentology*. The parameters of sedimentation, sediment classification, and laboratory methods of analysis. Prerequisites: Geology 108 or consent of instructor. 3 units. *Pilkey*

214. *Sediments in Thin Section*. The study of sediments and sedimentary rocks using the petrographic microscope and related techniques. Interpretation of rock textures and their genesis will be emphasized. Prerequisites: Geology 213. 3 units. *Perkins*

222. *Sedimentary Minerals*. Structure and geologic occurrences of selective detrital and authigenic minerals including the clay minerals. Theory and use of X-ray diffraction, differential thermal analysis, and thermal gravimetric analysis. Prerequisites: Geology 102 or consent of instructor. 3 units. *Heron*

*229. *Economic Geology*. An analysis of the principles and processes involved when elements are concentrated to economic proportions in magmatic, metamorphic, hydrothermal, sedimentary, or surface environments. Prerequisites: Geology 102. 3 units. *Furbish*

230. *Principles of Structural Geology*. Description, origin, and interpretation of primary and secondary geologic rock structures. Graphic solutions to structural problems. Prerequisites: Physics 2 and Geology 106, 108. Given biennially. 3 units. *Furbish*

241-242. *Invertebrate Paleontology*. Biologic and stratigraphic relationships of fossil invertebrates, with special emphasis on evolutionary trends of invertebrates as interpreted from fossil evidence. Prerequisites: Geology 2 or consent of instructor. Given biennially. 6 units. *Lynts*

†243-244. *Micropaleontology*. Microscopic animal and plant fossils, exclusive of spores and pollen, with special emphasis on their biology

*Offered on demand.

†Not offered in 1970-71.

taxonomy, evolution and stratigraphic distribution. Prerequisite: Geology 242 or consent of instructor. Given biennially. 6 units. *Lynts*

†247. *Paleoecology*. Application of ecologic and geologic principles to the reconstruction of the interrelationship between organisms and their environment in geologic time. Prerequisites: Geology 213, 242, or consent of instructor. Given biennially. 3 units. *Lynts*

251. *Geomathematics*. Application of quantitative techniques, including geometrics, to the characterization and solution of geologic problems. Prerequisites: Geology 2, a course in statistics, or consent of instructor. Given biennially. 3 units. *Lynts*

For Graduates

*300. *Seminar in Oceanography*. 1 to 3 units. *Staff*

*310. *Seminar in Stratigraphy*. 1 to 3 units. *Staff*

*312. *Seminar in Sedimentology*. 1 to 3 units. *Staff*

*320. *Seminar in Mineralogy*. 1 to 3 units. *Staff*

*330. *Seminar in Geochemistry*. 1 to 3 units. *Staff*

*340. *Seminar in Paleontology*. 1 to 3 units. *Staff*

*350. *Seminar in Geomathematics*. 1 to 3 units. *Staff*

*371, 372. *Advanced Topics in Geology*. To meet the individual needs of graduate students for independent study in various environmental sedimentary fields. 1 to 3 units. *Staff*

Germanic Languages and Literature

Professor Salinger, *Chairman and Director of Graduate Studies* (106 Foreign Languages); Professor Phelps; Assistant Professors Alt and Stern

The Department of Germanic Languages and Literature offers graduate work leading to the A.M. degree. Students who expect to major in German should have had sufficient undergraduate courses in Germanic languages to enable them to proceed to more advanced work.

Students who wish to take courses in German for a minor should normally have completed a third-year course (in exceptional cases, a second-year) of college German with acceptable grades.

For Seniors and Graduates

*201, 202. *Goethe*. A study of his life and works, in the light of his lasting significance to Germany and world literature. First semester: Lyrics, prose fiction and selected dramas; Second semester: *Faust, I & II*. 6 units. *Phelps and Salinger*

†Not offered in 1970-71.

*Offered on demand.

203, 204. *Eighteenth Century*. Eighteenth-century German literature in its relation to European intellectual currents of that time. 6 units. *Phelps*

*205, 206. *Middle High German*. The language and literature of Germany's first classical period. 6 units. *Stern*

*207, 208. *German Romanticism*. The principal writers of the period of German Romanticism from 1800 to 1850. 6 units.

209, 210. *Kleist, Grillparzer, and Hebbel*. The development of the drama in Germany and Austria between Schiller and Naturalism. 6 units. *Alt and Salinger*

211-212. *Nineteenth-Century Literature*. From the end of Romanticism through Realism. 6 units. *Alt*

213. *Heinrich Heine*. A study of the German poet and his impact upon his age. 3 units. *Salinger*

214. *The Twentieth Century*. Literature from the turn of the century to the present through representative authors. 3 units.

*215. *Seventeenth-Century Literature*. A study of the leading writers of the Baroque, viewed against the background of their time. 3 units.

216. *History of the German Language*. The development of the phonology, morphology, and syntax of German from earliest beginnings to the present. 3 units.

*217. *Renaissance and Reformation Literature*. The period from 1400 to about 1600. 3 units.

*218. *The Teaching of German*. A survey of modern teaching techniques; problems in the teaching of German on the secondary and college levels. Analysis and evaluation of textbooks and related audiovisual materials. 3 units. *Phelps*

*230. *German Cultural History*. A study of the backgrounds of German civilization and culture (*Kulturkunde*) from earliest times down to the most recent. 3 units.

*232. *Bibliography and Methods*. An introduction to the tools and methods of research in Germanic philology and German literature. 3 units.

*233. *Advanced Composition*. Intensive study of syntax; practice in the writing of German prose, aiming toward the development of an expressive and fluent style. 3 units.

For Graduates

*316. *The Austrian Novel from 1930 to the Present*. Studies in the novels of Hermann Broch, Robert Musil, and Heimito von Doderer. 3 units. *Salinger*

*321, 322. *Germanic Seminar*. 3 units each semester. *Phelps, Salinger, Alt, Stern*

*Offered on demand.

—*Graduate Reading Course.* An intensive course in German to develop rapidly the ability to read German in several fields. Graduate students only. No credit.

Related Courses in Other Departments

The following courses in other departments are recommended to students who are majoring in Germanics, as particularly valuable in building a proper background for Germanic studies:

a. Graduate courses in foreign or comparative literature or philology, offered by the ancient and modern language departments, to be selected after consultation with the Germanic Languages Department.

b. Graduate courses in history and philosophy, offered by those departments, to be selected after consultation with the Germanic Languages Department.

History

Professor Colton, *Chairman* (235 Allen); Professor TePaske, *Director of Graduate Studies* (237 Allen); Professors Alden, Durden, Embree, Ferguson, Hamilton, Hillerbrand, Holley, Lanning, Parker, Preston, Ropp, Silberman, and Watson; Associate Professors Acomb, Brieger, Davis, Ginter, Hollyday, Lerner, Oates, A. Scott, W. Scott, Uhalley, and Young; Assistant Professor Mauskopf

The Department of History offers graduate work leading to the A.M. and Ph.D. degrees. A thesis is required for the A.M. degree. A candidate for the degree of Doctor of Philosophy is required to prepare himself for examination in four fields, of which three shall normally be within history and one of which must be in American history or in the history of Western Europe. The choice and delimitation of fields is determined in consultation with the student's supervisor and the Director of Graduate Studies. The department offers graduate instruction in ancient history, medieval Europe, modern Europe, American history, England and Commonwealth, Russia, Latin America, the Far East in the modern period, South Asia in the modern period, military history, the history of science, the history of medicine, and historiography. The candidate for the A.M. degree must have a reading knowledge of at least one ancient or modern foreign language related to his program of study. The candidate for the Ph.D. degree must normally have a reading knowledge of two foreign languages, but in certain cases, where the candidate's supervisor and the Director of Graduate Studies approve, and where the candidate's research for the dissertation would appreciably benefit, an alternative to the second language may be accepted. This alter-

native would normally take the form of successfully completed formal training in an auxiliary discipline (such as, for example, statistics or social science methodology) of from three to six semester hours, or their equivalent, depending on the student's program. It also must be in addition to any previous undergraduate work in the discipline and to the six hours outside of history required for the A.M. degree. The requirement, whether satisfied by two languages or by one language and an alternative, must be met prior to the preliminary examination.

Students may receive credit for either semester of a hyphenated course without taking the other semester if they obtain written permission from the instructor and the Director of Graduate Studies.

For Seniors and Graduates

†201-202. *The History of Russia, 1801-1917*. The development of the Russian Empire in its political, social, and economic aspects, and the growth of forces leading to its downfall. 6 units.

†203-204. *The United States, 1850-1900*. The rise of sectionalism, secession, wartime problems of the Union and Confederacy, political and economic adjustments of Reconstruction, the status of the Negro, the New South, problems of capital and labor, the agrarian revolt, political parties, and reform. 6 units.

207-208. *City and Frontier in United States History*. 6 units. A. Scott

†209-210. *Constitutional History of the United States, 1760 to the Present*. A study of the basic problems in forming the Constitution; of its development through the major crises in the history of the United States; of the effects of changing social, cultural, economic, and political conditions on the Constitution. 6 units.

212. *Recent Interpretations of United States History*. A course designed to encourage a critical evaluation of major issues in United States history through examination of recent interpretations of key problems. 3 units. Watson

†213-214. *The Old South*. Political thought and party trends from Jefferson to Calhoun; agriculture, slavery, expansion; commerce, manufacturing, transportation; urban life, religion, education; the rise of Southern nationalism. 6 units.

220. *The Black Experience in the United States*. Origins to the present. 3 units.

†221-222. *The Age of the Renaissance*. The decline of characteristic features of medieval civilization and the rise of modern European institutions with particular attention to intellectual movements from Dante to Erasmus. 6 units.

223-224. *The Old Regime and the French Revolution, 1661-1815*. A study of social, political, and intellectual revolutions in continental Eu-

†Not offered in 1970-71.

rope, centering on France and giving special attention to successive interpretations of historical change. 6 units. *Acomb*

225, 226. *The Age of the Reformation and Counter-Reformation*. First semester: an advanced study of the years between 1517 and 1555, with particular reference to radical movements of reform. Second semester: the Counter Reformation, 1555-1650. (Also listed as Religion 250, 251.) 6 units. *Hillerbrand*

229. *Recent Interpretations of Modern European History*. A course designed to develop the ability to appraise critical historical issues through the study and discussion of recent interpretations of key historical problems in modern European history. 3 units. *Parker*

230. *The History of Spain*. From the late medieval period to the present. 3 units. *TePaske*

231-232. *The Hispanic Colonies and Republics in America*. First semester: the Spanish Conquest, the church, race, and society; the development of universities, medicine, and science. Second semester: the wars of independence, the Mexican revolution since 1910, problems of land, education, and public health. 6 units. *Lanning*

†233-234. *The Institutional, Cultural, and Social History of Hispanic America*. The first semester deals with the culture, society, and institutions of the Spanish colonies in America, and the second semester with those of the Hispanic American Republics. 6 units. *Lanning*

237-238. *Europe in the Middle Ages, 359-1500*. Attention is given both to distinctive attributes of the period, such as feudalism and scholastic learning, and to such formative elements of European civilization as nationalism and the universities. 6 units. *Young*

241-242. *Modernization and Revolution in China*. 6 units. *Uhalley*

247. *History of Modern India and Pakistan, 1707-1857*. Analysis and interpretation with special emphasis on changes in social and economic life. 3 units. *Embree*

248. *History of Modern India and Pakistan, 1857 to the Present*. 3 units. *Embree*

249-250. *Social and Intellectual History of the United States*. Evolution of American society and thought to the present; lectures and class discussions seek to illuminate the interplay of ideas and social practice by the examination of attitudes and institutions in such fields as science and technology, law, learning, and religion. 6 units. *Holley*

263-264. *American Colonial History and the Revolution, 1607-1789*. The founding and institutional development of the English colonies; the background, progress, and results of the Revolution. 6 units. *Alden*

265-266. *Modern South America*. Political, social, and economic history of leading South American nations from the mid-nineteenth century to the present. 6 units. *TePaske*

267-268. *From Medieval to Early Modern England*. The intellectual,

†Not offered in 1970-71.

social, and political problems of the transition to modern England, with special emphasis on the English Renaissance. 6 units. *Ferguson*

269. *British History, 1668-1867*. The Glorious Revolution, constitutional evolution, political methodology, Industrial Revolution, reforms, considered in context of the relationship of ideas and events. 3 units. *Hamilton*

270. *British History from Mid-Nineteenth Century*. Liberals and Conservatives, Irish Home Rule, the empire, wars and economic decline, the welfare state. 3 units. *Hamilton*

273, 274. *Topics in the History of Science*. Studies of critical stages in the evolution of scientific thought as well as of their intellectual context. 6 units. *Mauskopf*

275-276. *Central Europe, 1849-1914*. Conflict between liberalism and authoritarianism, clash of nationalities, and domestic changes in Italy, Germany, and Austria-Hungary. 6 units. *Hollyday*

† 277-278. *Reform and Politics in Nineteenth-Century United States*. 6 units. *Durden*

† 285. *Origins of Indian Civilization*. A study of the main sources and traditions of the classical civilization of the Indian subcontinent with particular attention to religious movements and institutions. (Also listed as Religion 285.) 3 units.

287-288. *History of Modern Japan*. Political, economic, and social development of Japan since 1750 with emphasis on factors contributing to Japan's emergence as a modern state. 6 units. *Silberman*

296. *Canada from the French Settlement to the Present*. Selected problems in the development of Canada and its provinces. 3 units. *Preston*

297. *The British Empire in the Nineteenth Century (from 1783)*. The development of the Empire from the American Revolution to the imperialism that culminated in the South African War. 3 units. *Preston*

298. *The Commonwealth in the Twentieth Century*. The origins and evolution of the Commonwealth of Nations and its adjustment in the age of anti-colonialism. 3 units. *Preston*

For courses in ancient history which may be taken for credit in either history or classical studies, see Classical Studies 253—*Greece to the Orientalizing Period*; 254—*The Age of the Tyrants and the Persian Wars*; 255—*The Age of Pericles*; 256—*The Fourth Century through Alexander*; 257—*Social and Cultural History of the Hellenistic World from Alexander to Augustus*; 258—*Social and Cultural History of the Graeco-Roman World*.

For Graduates

303-304. *The United States in the Twentieth Century*. Emphasis in the first semester is on the progressive era and World War I; the second

†Not offered in 1970-71.

semester is devoted to the twenties and the Franklin Roosevelt administration. 6 units. *Watson*

305-306. *Seminar in British History*. 6 units. *Ferguson and Hamilton*

307-308. *Seminar in United States History*. 6 units. *Davis, Durden, Holley, and Watson*

309-310. *Seminar in American Colonial and Revolutionary History*. 6 units. *Alden*

317-318. *Seminar in the History of Western Europe*. 6 units. *Colton, Parker, and Scott*

321-322. *Seminar in the History of Spain, Hispanic America, and Inter-American Relations*. 6 units. *Lanning*

337-338. *Seminar in Medieval History*. 6 units. *Young*

343-344. *Seminar in the History of American Foreign Relations*. 6 units. *Davis*

347-348. *Seminar in Modern India*. 6 units. *Embree*

353-354. *Seminar on the Second British Empire and the Commonwealth of Nations*. 6 units. *Preston*

†361-362. *Seminar in the History of Russia*. 6 units.

371-372. *Research Seminars*. Offered in conjunction with colloquia listed below. 6 units.

401. *Seminar on the British Commonwealth*. 3 units. *Braibanti, Preston, and Spengler*

Colloquia for Graduates

Each colloquium described below deals with an aspect of history by means of readings, oral and written reports, and discussion, with attention to bibliography. In some instances, students may take the equivalent of a research seminar in conjunction with the colloquium and will be credited with an additional 6 units by registering for 371.1-372.1, etc.

351.1-352.1. *Military History*. 6 units. *Ropp*

351.2-352.2. *Modern European Intellectual and Cultural History*. 6 units. *Parker*

351.10-352.10. *Medieval Europe*. 6 units. *Young*

351.15-352.15. *The English Renaissance*. 6 units. *Ferguson*

351.18-352.18. *England, 1660-1832*. 6 units. *Ginter*

351.25-352.25. *Central Europe, 1849-1914*. *Hollyday*

351.30-352.30. *European Diplomatic History since 1870*. 6 units. *W. Scott*

351.31-352.31. *Twentieth-Century Europe*. 6 units. *Colton*

351.40-352.40. *City and Frontier in United States History*. 6 units. *A. Scott*

351.45-352.45. *Reform and Politics in Nineteenth-Century America*. 6 units. *Durden*

†Not offered in 1970-71.

- 351.46-352.46. *Twentieth-Century United States*. 6 units. Watson
 351.47-352.47. *United States Diplomatic History*. 6 units. Davis
 351.60-352.60. *Soviet History*. 6 units. Lerner
 351.65-352.65. *Modernization and Revolution in China*. 6 units.
 Uhalley
 351.70-352.70. *Modern South Asia*. 6 units. Embree

Historiography and the Teaching of History For Graduates

312. *Seminar in the Teaching of History in College*. The work in this course is intended to acquaint students with the problems involved in teaching history in college. It includes classroom observation and some teaching experience. Required of all candidates for the degree of Doctor of Philosophy who are in residence as many as two years at Duke. Year course. 2 units. Holley and Watson

314. *Historical and Social Science Methodology*. Readings and short weekly papers in the wide range of theory developed by historians and social scientists and pertinent to the problems of historical interpretation. Year course. 6 units. Ginter

320. *Historiography*. A study of the great historians from Herodotus to Henry Adams and of the new social science and humanities approaches to history. Year course. 4 units. Parker

History 314 or History 320 is required of all candidates for the degree of Doctor of Philosophy who are in residence as many as two years at Duke University.

Hospital Administration

Professor Frenzel, *Program Director* (234-B Baker House); Associate Professor Swanson; Assistant Professor Smith, *Coordinator of Graduate Studies* (234-B Baker House); Instructor Schoonhagen

Graduate study leading toward preparation for a career of administration in hospitals and other health agencies is offered through a 24-month program leading to the M.H.A. degree. The program is composed of 36 graduate units, of which 18 are in Hospital Administration and 18 are in designated courses in business administration, economics, political science, and sociology. Included in the program is a 12-month administrative residency, a period of supervised administrative experience conducted under faculty supervision in hospitals and other health agencies located within commuting distance of the University campus. Admission to this program is limited to 16 students per year; selection is based on suitability for management of health agencies as well as on capability for

graduate study. As there are requirements for participation in the program in Hospital Administration in addition to basic admission requirements of the Graduate School, interested individuals should obtain complete information on prerequisites and selection procedures from the Coordinator of Graduate Studies.

201. *History and Development of Hospitals and Other Health Agencies.* This course is designed to give the student a broad concept of the health field. It includes a study of the evolution of health institutions; analysis of medical care organizations in the United States, and the emergence of the health professions. 3 units. *Smith*

203-204. *Principles of Organization and Management of Hospitals and Other Health Agencies.* A study of the hospital as an institution including its administrative structure, relationship of the medical staff, and the organization and function of each department. At the same time study is made of the general principles underlying administration so that the student can relate these general principles to the hospital situation. Emphasis on the financial, legal, staffing, community relationship, and other managerial considerations of hospital administration. 6 units. *Frenzel, Swanson, and Smith*

211-212. *Seminars in Health Administration.* A series of seminars designed to complement and add depth to the material covered during the first year, to analyze further the operation of hospitals and other health agencies, and to make the experiences of the residency meaningful. Attention will be given to formalized techniques of problem-solving, decision-making, human relations, communications, and relating day-to-day experiences to the management process. Special emphasis on social and economic aspects of health care and on identifying and projecting current trends in the health field. 6 units. *Frenzel and Smith*

215. *Administrative Residency (one calendar year).* Designed to give the student broader and deeper knowledge and understanding of hospitals and other health agencies through practical experience. Varied experience is provided by rotation through a university medical center, a community hospital, a Veterans Administration and special hospitals, a public health department, a prepayment plan, and other governmental and voluntary health agencies. Two months of the residency will be spent in field experience with the Hospital Section of The Duke Endowment. 3 units. *Staff and Preceptors*

Mathematics

Professor Warner, *Chairman* (135C Physics Building); Associate Professor Smith, *Director of Graduate Studies* (135D Physics Building); Professors Carlitz, Dressel, Gallie, Murray, Roberts, Shoenfield, Weisfeld, and Woodbury; Associate Professors Bryson, Burdick, Burlak, Kitchen,

Patrick, Reynolds, and Stackelberg; Assistant Professors Dankel, Henson, Herr, Hodel, Moore, O'Fallon, O'Neill, Scoville, Shauck, and Wilkinson; Adjunct Professor Sewell

Graduate work in the Department of Mathematics is offered leading to the A.M. and Ph.D. degrees. The student, in his undergraduate work, must have had courses in differential and integral calculus, and at least six semester hours of other courses in mathematics on the junior or senior level.

The A.M. degree with a major in mathematics is awarded primarily on the basis of scholarship. Of the 24 units of course work required for this degree, 18 units must be taken in the Department of Mathematics.

The Ph.D. degree in mathematics is awarded upon the demonstration of ability and training in research. The original dissertation, therefore, is the most important of the formal requirements for the degree.

Since a reading knowledge of French, German, and Russian is highly desirable for the student of mathematics, he should satisfy the language requirement in one of these languages as early as possible. The department urges students to attain a reading knowledge of at least two of these languages. Members of the faculty remain free to assign readings in them for course work or dissertation work.

204. *Geometry for Teachers*. Metric and synthetic approaches to plane and solid geometry; affine geometry; an algebraic model of Euclidean geometry. 3 units. *Reynolds*

217, 218. *Intermediate Analysis*. The real and complex number systems, sequences and series, continuity, differentiation, integration. Prerequisite: Mathematics 63 for 217; and 217 for 218. 6 units. *Kitchen*

221, 222. *Numerical Analysis*. Introduction to numerical analysis, error analysis, interpolation, numerical differentiation and integration, summation, numerical solutions of ordinary differential equations, real and complex roots of equations, solution of simultaneous equations and matrix inversion, calculation of eigenvalues and eigenvectors, numerical solution of partial differential equations, linear programming, and least-squares techniques. A knowledge of computer programming is assumed. *Patrick*

*227, 228. *Theory of Numbers*. Congruences, arithmetic functions, compound moduli, quadratic reciprocity, Gauss sums, quadratic forms, sums of squares. Prerequisite: calculus. 6 units. *Carlitz*

*229, 230. *Algebraic Numbers*. Ideals, unique factorization, divisors of the discriminant, determination of the class number. Prerequisite: theory of equations. 6 units. *Carlitz*

*234. *Sample Designs*. Methods of constructing and analyzing survey designs; elements of simple random sampling, stratified sampling, multi-stage sampling; methods of estimation; questionnaire construction; re-

*Offered on demand.

fusals and not-at-homes. Prerequisite: Mathematics 133. 3 units. *Bryson*

235, 236. *Abstract Algebra*. Groups, rings, fields, vector spaces, polynomials, Galois theory, linear operators, inner product spaces. Prerequisite: Mathematics 114 or consent of the instructor. 6 units. *Scoville*

*244. *Design of Experiments*. Methods of constructing and analyzing designs for experimental investigations, Latin square, split-plot, simple and partially confounded factorial designs, incomplete block designs, treatment of missing data, techniques of experimentation. Prerequisite: Mathematics 233. 3 units. *Burdick*

245, 246. *Combinatorial Analysis*. Generating functions, permutations, distributions, partitions, compositions, trees, and networks. Prerequisite: calculus. 6 units. *Carlitz*

*247, 248. *Arithmetic of Polynomials*. Field theory, detailed study of finite fields, special polynomials and functions, valuation theory, the zeta function. Prerequisite: Mathematics 236 or consent of the instructor. 6 units. *Carlitz*

*262. *Non-Parametric Statistics*. A study of statistical tests in which no assumption about the underlying distribution is made; one sample, two sample, k sample tests for nominal, ordinal and interval scales; non-parametric measures of correlation, efficiency of tests. Prerequisite: Mathematics 244 or consent of the instructor. 3 units. *Bryson*

271, 272. *Introductory Topology*. Basic set theory; topological spaces; separation axioms; metric spaces; continuity; connectedness; paracompactness. Prerequisite: calculus. 6 units. *Hodel*

*275, 276. *Probability*. Foundations of probability. Random variables; distributions; central limit problem; law of large numbers; limit and ergodic theorems. Prerequisites: Mathematics 135; or calculus and consent of the instructor. 6 units. *Wilkinson*

283. *Applied Mathematical Statistics*. Basic probability concepts, the sample space, discrete and continuous events, permutations and combinations, conditional and marginal probability, discrete and continuous distributions, expected values and moments, sampling distributions, estimation, hypothesis testing, confidence intervals, basic queuing theory. Prerequisite: Mathematics 64. 3 units. *Herr*

284. *Least Squares Analysis of Linear Models*. General linear models; geometrical interpretations; multiple regression; one-way and multi-way analysis of variance; fixed, random, and mixed models; experimental design models; analysis of covariance; introduction to non-linear models. Prerequisite: Mathematics 136 or 283. 3 units. *Burdick*

285. *Applied Mathematical Methods I*. Vectors, line and surface integrals, tensors, complex variables, differential and integral equations. Prerequisite: Mathematics 63. 3 units. *Dressel and Dankel*

*Offered on demand.

286. *Applied Mathematical Methods II*. Wave equation, Fourier series, heat equation, telegraphic equations. Legendre polynomials, Bessel functions, Schrodinger's equation. Prerequisite: Mathematics 63. 3 units. *Dressel and Dankel*

*287, 288. *Foundations of Mathematics*. Propositional calculus, predicate calculus, axiomatized number theory. Godel completeness and incompleteness theorems. Recursive functions; hierarchies; constructive ordinals. Set theory; consistency of the axiom of choice. Prerequisite: Mathematics 114 or Philosophy 103, or consent of the instructor. (See also Philosophy 287-288.) 6 units. *Henson*

*289. *Applications of Stochastic Processes I*. Recurrent events, random walk, Markov chains and processes, queuing theory, branching and diffusion processes. Prerequisites: Mathematics 135 and 140, or consent of the instructor. 3 units. *Wilkinson*

*290. *Applications of Stochastic Processes II*. Linear operators, spectral representations, time series, multivariate analysis, auto-regressive schemes, Gaussian processes, cross-correlation functions, smoothing, filtering, prediction, Wiener-Hopf Equation, diffusion processes, Fokker-Planck Equation, first-passage times. Prerequisite: Mathematics 289 or consent of the instructor. 3 units. *Wilkinson*

291, 292. *Analysis I, II*. Theory of analytic functions, measure and integration theory, introduction to functional analysis. Prerequisite: Mathematics 218 or 140, or consent of the instructor. 6 units. *O'Neill*

*293. *Multivariate Statistics*. Basic multinormal distribution theory, the multivariate general linear model including the use of Hotelling's T^2 statistic and the Roy union-intersection principle, principal components, canonical analysis, and factor analysis. Prerequisite: Mathematics 284, or consent of the instructor. 3 units. *O'Fallon*

295. *Mathematical Foundations of Statistical Inference*. Inference-theoretic approach to hypothesis testing, decision-making, and estimation; Neyman-Pearson fundamental lemma; uniformly most powerful tests; Fisher's information and sufficiency; invariance and unbiasedness. Prerequisite: Mathematics 275 or consent of the instructor. 3 units. *Herr*

*297, 298. *Axiomatic Set Theory*. Statement and development of Zermelo-Fraenkel axioms. Consistency and independence problems. New axioms and their consequences. Prerequisite: consent of the instructor. 6 units. *Shoenfield*

For Graduates

*303-304. *Advanced Theory of Numbers*. Cubic and quartic reciprocity, partitions and diophantine analysis, sums of squares. Prerequisite: Mathematics 228, or consent of instructor. 6 units. *Carlitz*

*Offered on demand.

325-326. *Analysis III, IV*. Advanced topics in complex and real analysis, measure and integration theory, functional analysis. Prerequisite: Mathematics 292 for 325; and 325 for 326. 6 units. *Kitchen*

*327-328. *Partial Differential Equations*. Boundary and initial value problems, regularity and existence theorems by methods of *a priori* estimates and functional analysis. Representations of solutions, spectral theory, and potential theory. Prerequisite: Mathematics 291-292, or consent of the instructor. 6 units. *Burlak*

*329-330. *Theory of Distributions*. Test functions, distributions, topological vector spaces; applications to the operational calculus, partial differential equations, and mathematical physics. 6 units. *Burlak*

*333-334. *Analytic Theory of Numbers*. Distribution of primes, primes in an arithmetic progression, Waring and Goldbach problems, applications of elliptic functions. Prerequisite: Mathematics 291-292. 6 units. *Carlitz*

*335-336. *Topics in Algebra*. Advanced topics in algebra to be selected from areas of current research. Prerequisite: Mathematics 236 or consent of the instructor. 6 units. *Weisfeld*

*343-344. *Differential Equations*. Manifolds, sheaves, differential operators and their prolongations, Spencer sequences, δ -cohomology, existence theorems for analytic partial differential equations, the δ -estimate, D-Neumann problem. Prerequisite: Mathematics 236, 272, and 292, or consent of the instructor. 6 units. *Weisfeld*

353-354. *Topics in Analysis*. Advanced topics in real and complex analysis to be selected from areas of current research. Prerequisite: Mathematics 325, which may be taken concurrently. 6 units. *Staff*

*371-372. *Dimension Theory*. Theory of covers in normal spaces; inductive and covering dimension of metric spaces and of normal spaces; dimension of Euclidean spaces; mapping in spheres and applications; metric dimension and other metric-dependent functions. Prerequisites: Mathematics 271-272. 6 units. *Roberts*

*383-384. *Lie Groups and Algebras*. Differential manifolds; Lie groups; one-parameter subgroups; Lie algebras; differential forms; classification and representations of compact Lie groups and semisimple Lie algebras; solvable and nilpotent algebras; Ado's theorem. Prerequisites: Mathematics 236, 271, and either Mathematics 218 or 291. 6 units. *Shoenfeld*

M385. *Mathematics of Physiological Systems*. Solutions of physiological problems by automatic computation techniques. Principles of analog and digital computation—simulation and computation of mathematical models of biological systems developed from statistical and engineering approaches. Prerequisite: consent of the instructors. (See also Physiology M385.) 3 units. *Moore and Woodbury*

*Offered on demand.

*395-396. *Topological Algebra*. Normed and locally convex spaces, Banach algebras. Prerequisites: Mathematics 236 and 292, or consent of the instructor. 6 units. *Kitchen*

397-398. *Seminar in Algebra and Number Theory*. Prerequisite: consent of the instructor. 6 units. *Carlitz*

Microbiology and Immunology

Professor Joklik, *Chairman* (Research Park I); Professor Day, *Director of Graduate Studies* (4546 Clinical Research I); Professors Amos, Beard, Conant, Larsh, Rundles, and Willett; Associate Professors Burns, Metzgar, Osterhout, and Wheat; Assistant Professors Buckley, Luftig, and Ward

The department offers A.M. (with or without thesis) and Ph.D. degrees in microbiology with specialization possible in any of six areas: (1) cell biology (mammalian, avian, and microbial), (2) microbial physiology, (3) immunochemistry, (4) medical bacteriology and mycology, (5) immunogenetics, and (6) general immunology. Undergraduate preparation in biochemistry is strongly urged. A brochure may be requested from the Director of Graduate Studies, Box 3045, Duke Medical Center, which describes the degree program, the special requirements, and the fellowships available.

251. *Biochemistry of Development*. Current concepts of control mechanisms in embryonic development and differentiation discussed at the cellular, biochemical, and molecular level. (Listed also as Biochemistry 251.) (Fall, 1970, and alternate years with Microbiology 371.) 2 units. *McCarty, Harris, Joklik, and Turkington*

316. *Immunogenetics*. Production of inbred and coisogenic strains. Mutation and recombination in inbred animals and tumors. Genetic control of histocompatibility iso-antigens in tumors and normal tissues, differential gene action in hybrids and tumors. Antigenic and immunologic factors in homograft rejection, tests for genetic compatibility. Modification of the immune response by genetic or immunologic procedures—tolerance, enhancement, suppression of antigens. 2 units. *Amos*

325. *Medical Mycology*. This course is intended to familiarize the graduate student majoring in mycology with the fungi-causing disease in man and animal. The course includes practical laboratory work with materials from patients in Duke Hospital and those sent to the Duke Fungus Registry from outside sources. Prerequisites: A.M. in botany with major in mycology and M221. Maximum enrollment: four students each year. 4 units each semester. *Conant*

*Offered on demand.

†371. *Animal Cell Biology*. An introduction to morphology, fractionation, characterization, and synthesis of cellular organelles (chromosomes, membranes, ribosomes, nucleoli, lysosomes). The use of tissue culture systems for studying cellular functions, synthesis of nucleohistones, the mitotic cycle. (Fall, alternate years with 251.) (Also listed as Biochemistry 371.) *Joklik, McCarty, and Staff*

381, 382. *Bacterial Physiology I and II*. The structure, composition, growth, and metabolism of bacterial cells with emphasis on the biochemical and regulatory aspects. 4 units. *Burns, Wheat, and Willett*

384. *Virology*. The structure and replication of viruses with emphasis on the molecular and functional aspects. Bacteriophages are discussed first, mammalian and avian viruses next. 2 units. (Spring.) *Joklik and Luftig*

391, 392. *Immunology I and II*. Structure and function of immunoglobulins. Characteristics of synthetic and natural antigens. Cellular aspects and kinetics of antibody formation. Forms of immunologic responsiveness. Elicitation and control of immune response. Phylogeny and ontogeny of immunity. Specificity and cross-reactivity. Methods of immunologic analysis. Tolerance, enhancement, autoimmunity, and allergy. 4 units each semester. *Staff*

Music

Associate Professor Kirkendale, *Director of Graduate Studies*; Professor Hamilton; Associate Professor Earls

The Department of Music offers graduate work leading to the A.M. degree, with concentration in either music history or composition. The prerequisite is normally the A.B. degree with a major in music and courses in music theory, music history, foreign language, and other subjects in the humanities. Facility in an instrument is also expected. Students who wish to concentrate in composition submit with their application evidence of traditional contrapuntal skills in invention and fugue, and replaceable copies of two recent compositions. Reading knowledge of German and one of Italian, French, or Latin is required for the A.M. degree. Knowledge of one of these should be demonstrated prior to admission.

The course work required of students concentrating in music history includes Music 200; three electives chosen from Music 210, 220, 230, 240, and 330; one elective from Music 250 and 260. A thesis written on a strictly limited topic in music history is required for completion of the degree.

Students concentrating in composition take Music 200; one elective

†Not offered in 1970-71.

chosen from Music 210, 220, and 230; two electives from Music 240, 250, and 260; and Music 320. For completion of the degree, the student concentrating in composition submits an extended musical work showing skill and originality in the use of compositional techniques, and subject to the approval of the examining committee.

All students choose six units of a minor from European history, literature, or art history and three additional units from this group or from music. The content of the music courses varies from year to year. In most cases a course deals with a specialized topic within the area defined by the course title.

For Seniors and Graduates

200. *Introduction to Graduate Study*. Bibliography, historiography, methods of musicology, editorial technique. 3 units. Staff

210. *Studies in Music of the Middle Ages*. 3 units. Staff

220. *Studies in Music of the Renaissance*. 3 units. Staff

230. *Studies in Music of the Baroque Period*. 3 units. Staff

240. *Studies in Music from the Mid-Eighteenth Century to the Death of Beethoven*. 3 units. Staff

250. *Studies in Music of the Nineteenth Century after Beethoven*. 3 units. Staff

260. *Studies in Music of the Twentieth Century*. 3 units. Staff

For Graduates

319. *Studies in Contemporary Analysis*. 3 units. Earls

320. *Seminar in Composition*. 3 units. Hamilton

330, 331. *Special Studies in Music History*: Paleographical exercises, independent readings, and term papers. 3 units each semester. Kirken-
dale

Nursing

Professor Brown, *Dean of Nursing* (113 Hanes); Professor Stone, *Director of Graduate Studies* (128 Hanes); Professor Crossland; Associate Professors Helvie, Reckless, and Shaughnessy

The School of Nursing offers a program in advanced nursing leading to the degree of Master of Science in Nursing. The program is designed to encourage the exploration of the theoretical foundation for nursing practice based on scientific processes. Freedom to select courses permits concentration of study appropriate to the interests, abilities, and goals of each student.

The core content provides the individual with an opportunity to become familiar with scientific methods relating to nursing practice, to design nursing research projects, and to begin to develop theory of nursing practice in a selected area.

Throughout the year, focus will be on clinical practice; therefore, the student will use the laboratories located in the medical complex and in the community to explore and test theories.

The program of study covers four semesters, and it is approved by the National League for Nursing.

N251. *Human Behavior and Group Process*. This course focuses on the various theories of personality development and the subsequent development of normal and abnormal behavior. The course is oriented as an overview with an interdisciplinary approach encompassing theoretical hypotheses from psychology and descriptive psychiatry. Concomitant with this, a student is given an introduction to group process and group therapy and has the opportunity of observing ongoing therapeutic groups. 3 units. *Reckless*

N261. *Development of Nursing Theory*. An overview of the theoretical and scientific bases of nursing practice, and an introduction to development of nursing theory. 3 units. *Crossland and Staff*

N262. *Development of Nursing Theory*. Continuation of N261; the process of deriving and testing hypotheses in the clinical or community setting. 3 units. *Crossland and Staff*

N265. *Methods of Research in Nursing*. An exploration of the research process in the area of nursing; particular emphasis on review and evaluation of reported nursing research. 3 units. *Stone*

N333. *Curriculum Planning in Professional Nursing Schools*. A study of the bases, theoretical approaches, and evaluation of curriculum with focus on the process of curriculum change in professional nursing schools. 3 units. *Crossland*

N335. *Gerontological Nursing*. An examination of selected gerontological research and its implications for gerontological nursing. 3 units. *Stone*

N337. *Psychiatric Nursing*. Exploration of the scientific theories relating to the psychodynamics of mental illnesses and their implications for nursing intervention. Students may select specific areas for investigation, such as community mental health nursing or geropsychiatric nursing. 3 units. *Stone and Staff*

N360. *Thesis Research*. Student initiates, conducts, and reports research on a nursing problem under the direction of the faculty. 4 units. *Staff*

N365. *Independent Study in Nursing*. Culminating experience designed to enable the student to synthesize previous and concurrent study. Setting to be selected in accordance with the goals of the student. 5 units. *Staff*

Pathology

Professor Kinney, *Chairman* (301B Medical School); Professor Trump, *Director of Graduate Studies* (263 Medical School); Professors Fetter, Hackel, Vazquez, and Vogel; Associate Professors Elchlepp, Klintworth, Rowlands, Sommer, and Wittels; Assistant Professors Burkholder and Sage

The Department of Pathology offers graduate work leading to the Ph.D. degree with areas of specialization such as subcellular and molecular pathology, immunopathology, and neuropathology. Course work is designed to give a broad background in classical and modern pathology with emphasis on the application of biophysical, biomathematical, and biochemical approaches. Students will be required to take such courses as are necessary to obtain this foundation. In general, students will be required to take course work that is best adapted to areas of specialty and research. Further information including brochures giving details about the departmental facilities, staff, trainee stipends, and the M.D.-Ph.D. program are available from the Director of Graduate Studies.

M350. *General Pathology.* The fundamentals of pathology are presented to the student. Lectures developing broad concepts of disease processes are given by the members of the senior staff. The emphasis is placed on etiology and pathogenesis of disease and the experimental approach to an understanding of disease. Gross and microscopic material is correlated and related to disease processes. Lecture, laboratory, and conferences. Prerequisite: permission of instructor. 8 units. *Kinney and Staff*

M352. *Basic Problems in Chemical Pathology. This is an advanced seminar tutorial course in which the biochemical and physiological expressions of morphologic abnormalities will be explored. A specific organ system, namely the heart, will be used as a model for instruction and discussion. Experimental approaches toward solutions of problems will be discussed. Prerequisite: permission of instructor. 2 units. *Wittels*

M353. *Advanced Neuropathology.* This course deals with current problems and research methods related to diseases which affect the nervous system. Prerequisite: permission of instructor. 2 units. *Vogel*

M354. *Immunopathology.* The first part of the course will deal with a conceptual approach to basic immunology with emphasis on immunologic theory of antibody synthesis, tolerance, and autoimmunity. In addition, an introduction to the methodology of immunochemistry will be given. The main aspect of the course will emphasize pathogenetic concepts of experimental and human diseases of "hypersensitivity origin" particularly the study of the function and morphology of pathologic states. Prerequisite: permission of instructor. 2 units. *Vazquez and Staff*

*Offered on demand.

M355, M356. *Seminar in Pathology*. Discussions outlining the scope of modern pathology. This will include reports of original researches by members of staff and visitors. 1 unit each semester. *Members of Staff*

M357. *Research in Pathology*. Independent research projects in various fields of pathology. Time and credit to be arranged. *Members of Staff*

M358. *Cellular and Subcellular Pathology*. This course is designed for students wishing to broaden their knowledge of cellular structure and cellular pathology. The course will consist of a series of lectures and seminars discussing the alterations in cellular structure and associated function that accompany cell injury. Prerequisite: permission of instructor. 2 units. *Trump and Sommer*

†M359. *Applied Instrumentation*. Emphasis will be placed on the theory and application of electron microscopy to ultrastructural pathology. The methods relating to electron microscopy as well as phase and polarization microscopy will be considered. Lectures, seminars, and laboratories. Prerequisite: concurrent or previous enrollment in M358. 2 units. *Trump and Staff*

M360. *Enzymatic and Determinative Histochemistry*. This course is designed for students who wish an understanding of the theoretical basis of the methods utilized for cellular and subcellular localization of chemical constituents of cells. The course consists of an intensive series of lectures and laboratory sessions which emphasize modern techniques for tissue preservation and intracellular localization and identification of natural products and enzymes. In addition to formal experiments demonstrating the techniques, students will be encouraged to work on a selected project. 2 units. *Trump and Sommer*

*M361, M362. *Advanced General Pathology*. A detailed consideration of the morphologic, physiologic, and biochemical manifestations of disease. Emphasis is on individual work in the laboratory with tutorial supervision. Gross dissection, histologic examination, processing, and analyzing of morphologic, microbiologic and biochemical data, and interpretation of results. Prerequisites: M350 and permission of instructor. 6 units. *Staff*

M363. *Seminar in Electron Microscopy*. This course consists of a series of seminar discussions concerning recent advances in subcellular and molecular pathology. Discussions related to modern advances in cellular ultrastructure and their relevance to the study of disease processes. 1 unit. *Trump*

M364. *Systemic Pathology*. Systematic presentation of the characteristics of disease processes as they affect specific organ systems in mammals. Prerequisites: Pathology 350 and 351. 6 units. *Hackel*

†Not offered in 1970-71.

*Offered on demand.

Philosophy

Professor Welsh, *Chairman* (203D West Duke Building); Professor Peach, *Director of Graduate Studies* (201B West Duke Building); Professors Baylis, Clark, and Negley; Assistant Professors Aquila and Mahoney

The Department of Philosophy offers graduate work leading to the A.M. and Ph.D. degrees. Tutorial work complements formal instruction. Students may specialize in any of the following fields: the history of philosophy, logic, philosophy of science, epistemology, metaphysics, philosophical analysis, ethics, aesthetics, political philosophy, and philosophy of law.

Individual programs of study are developed for each student. The following requirements, however, are fundamental: (1) In February of their first year new graduate students are required to take two or three qualifying examinations, diagnostic in purpose. One examination is in the history of philosophy, ancient and modern; a second examines his ability to deal critically and systematically with some basic philosophical topic; a third examination, in logic, is required of anyone who has not taken Philosophy 331-a, Logic. (2) The preliminary examinations for the Ph.D., which may be taken only after a student has met the language requirement for that degree, should be taken during the first year of study beyond the A.M. degree or at the end of the second year. In these examinations students are expected to combine historical knowledge with critical understanding.

Work in a minor field, not necessarily confined to any one department, must include six units for the A.M. or the Ph.D. and may include more as a student's program requires or permits.

A student who meets the general requirements of the Graduate School for the A.M. degree may earn this degree by passing an examination for a reading knowledge of a foreign language and the preliminary examinations for the Ph.D. degree or by writing and successfully defending a master's thesis.

A reading knowledge of at least one foreign language, ancient or modern, is required for the Ph.D. degree. No student may take his preliminary examinations until he has demonstrated this ability. The specific requirement will be determined according to the candidate's area of special research. More than one language may be required where this is judged appropriate to the research demanded by the candidate's dissertation.

For Seniors and Graduates

202. *Aesthetics: The Philosophy of Criticism.* A study of some fundamental issues in aesthetics with particular reference to the fields of lit-

erature, music and painting. Problems discussed include the role of standards in criticism, aesthetic judgment, interpretation, and evaluation in literature, meaning in the arts, art and truth, the arts and morality. 3 units. *Welsh*

203. *Contemporary Ethical Theories*. Study of the nature and justification of basic ethical concepts and principles in the light of the chief ethical theories of twentieth-century British and American philosophers. 3 units. *Baylis*

205. *Philosophy of History*. Discussion of the method, metaphysical implications and influence of interpretations of history: Hegel, Marx, Spengler, Toynbee. 3 units. *Negley*

208. *Political Values*. Analysis of the systematic justification of political principles and the status of political values in the administration of law. 3 units. *Negley*

211. *Plato*. A critical study of selected dialogues with special emphasis on problems in epistemology, and metaphysics. 3 units. *Mahoney*

217. *Aristotle*. A study of passages from the *Organon*, *Physics*, *De Anima*, and *Metaphysics*. 3 units. *Mahoney*

218. *Medieval Philosophy*. A critical examination of selected problems in medieval philosophy. 3 units. *Mahoney*

*219. *Kant's Moral Philosophy*. Reading and discussion of his writings on morals, with some attention to historical continuity. 3 units. *Negley*

†225. *British Empiricism*. A critical study of the writings of Locke, Berkeley, or Hume, with special emphasis on problems in the theory of knowledge. *Peach*

227. *Continental Rationalism*. A critical study of the writings of Descartes, Spinoza, or Leibniz, with special emphasis on problems in the theory of knowledge and metaphysics. (1970-71: Descartes.) 3 units. *Peach*

228. *Recent and Contemporary Philosophy*. A critical study of some contemporary movements in philosophy with special emphasis on the work of Moore, Russell, Wittgenstein, Wisdom, and Ryle. 3 units. *Welsh*

*229. *American Pragmatism*. Studies in the philosophy of Peirce, James, Dewey, and Mead. 3 units. *Welsh*

230. *The Meaning of Religious Language*. An analysis of the credentials of some typical claims of theism in the light of theories of meaning in recent thought. Prerequisite: Contemporary Theology 232-233, or consent of instructor. (Also listed as Religion 230.) 3 units. *Poteat*

231. *Classical German Philosophy*. Selected topics in 18th and 19th century German philosophy. (1970-71: Kant's *Critique of Pure Reason*.) 3 units. *Aquila*

*Offered on demand.

†Not offered in 1970-71.

233. *Methodology of the Empirical Sciences*. An introduction to recent philosophical discussion of a variety of problems, e.g., the concept of a scientific explanation, the nature of laws, theory and observation, and other topics. Approval of the instructor is required for undergraduates and for students from departments other than Philosophy. 3 units. *Kalke*

234. *Problems in the Philosophy of Science*. Selected problems in the physical and non-physical sciences, e.g., space and time, measurement, probability and induction, the philosophy of the behavioral and social sciences. Approval of the instructor is required for undergraduates and for students from departments other than Philosophy. 3 units. *Kalke*

*241. *Logic*. Fundamental Problems of Logic. 3 units. *Clark*

250. *Philosophical Analysis*. A critical study of recent and contemporary essays in philosophical analysis, and an evaluation of the nature, methods, and results of this movement. 3 units. *Baylis and Clark*

*251 *Epistemology*. A discussion of the nature and limits of knowledge, with some reference to the problems of certainty and perception. 3 units. *Baylis*

252. *Metaphysics*. A critical and evaluative study of rival metaphysical theories and their bases. Analysis of the fundamental metaphysical categories and of metaphysical methods. 3 units. *Baylis*

*253. *Philosophy of Mind*. An analysis of mental concepts such as thought, belief; and such issues as mind-body relations, thought and action; the nature of persons and personal identity. 3 units. *Clark*

287-288. *Foundations of Mathematics*. Propositional calculus, predicate calculus, axiomatized number theory. Gödel completeness and incompleteness theorems. Recursive functions; hierarchies; constructive ordinals. Set theory; consistency of the axiom of choice. Prerequisite: Mathematics 53 or consent of instructor. (Also listed as Mathematics 287-288.) 6 units. *Shoenfield*

291, 292. *Critical Philosophy*. The analysis of basic philosophical concepts and beliefs with a view to critical evaluation and constructive emendation of them. Emphasis on the practice as well as the principles of philosophical criticism and problem-solving. 3 units each. Prerequisite: permission of the department; 291 is ordinarily prerequisite for 292. *All Members of the Graduate Staff*

For Graduates

331, 332. *Seminar in Special Fields of Philosophy*. 3 units. *All Members of the Graduate Staff*

*Offered on demand.

Physical Therapy

Professor Jacobs, *Chairman and Director of Graduate Studies* (045 Hospital); Professor Kaiser; Assistant Professor Villanueva

The Department of Physical Therapy will offer a graduate program leading to the M.S. degree beginning in September, 1970. Before undertaking graduate work in physical therapy a student should have a background in the basic sciences and social sciences including course work in biology, chemistry, physics, psychology, and mathematics. Further information may be obtained from the Director of Graduate Studies, Department of Physical Therapy, Box 3247, Duke University Medical Center.

201-202. *Seminar in Physical Therapy*. Historical background and trends in the profession; orientation to physical therapy departmental organization and administration; professional and community relationships; professional ethics; and methods of communication with emphasis on scientific writing and current literature. Units by arrangement. *Jacobs, Kaiser, and Staff*

217. *Physical Therapy Dynamics I*. Regional approach to functional anatomy, biomechanics, developmental patterns of movement and posture; evaluation; theory and practice of selected therapeutic methods. 4 units. *Villanueva and Staff*

218. *Physical Therapy Dynamics II*. Principles and practice of physical therapy; biophysical and physiological considerations for utilization of selected therapeutic agents (mechanical, thermal, chemical and electrical) with emphasis on methods of neuromuscular re-education. 5 units. *Villanueva and Staff*

220. *Physical Therapy Dynamics III*. Principles and practice of physical therapy; principles of prevention of deformity and disability; methods of facilitation of functional capacity; use of orthotic and prosthetic devices; synthesis of theory and practice in planning effective treatment programs. 4 units. *Villanueva and Staff*

230. *Physical Evaluation and Instrumentation*. Principles and techniques of objective assessment and analysis of functional status as performed by the physical therapist including manual muscle tests, goniometry, electrical diagnostic testing, posture analysis, body measurements, evaluation of respiratory and sensory function, check-outs for prosthetic devices, disability evaluation, prevocational testing, and orientation to electromyography and dynamometry. 3 units. *Jacobs and Staff*

234. *Introductory Pathology*. Fundamentals of pathology, with emphasis on broad concepts of disease processes; systems of the body are studied from the point of view of histological and functional change. 3 units. *Jacobs and Special Lecturers*

236. *Medical Sciences*. Lectures by clinicians with patient demonstrations and correlation of treatment methods; medical and surgical, neurological, orthopedic and emotional conditions effecting human dysfunction; emphasis on psychodynamic principles of patient-therapist relationships. 5 units. *Jacobs, Staff, and Special Lecturers*

242. *Directed Clinical Experience in Physical Therapy I*. Students are assigned part-time to hospitals, rehabilitation centers, schools for crippled children, extended-care facilities, and public health units for a closely supervised learning experience. 1 to 4 units. *Villanueva and Staff*

243. *Directed Clinical Experience in Physical Therapy II*. Students are assigned to a full-time learning experience under direction. 4 to 8 units. *Villanueva and Staff*

301. *Introduction to Scientific Inquiry*. Theory and use of analytical methods of problem solving; elements of scientific writing; literature review and preparation of a major paper. 3 units. *Staff*

315. *Curriculum Development*. Introduction to learning theory; development of objectives, organization, course content and evaluation in physical therapy education. 2 to 3 units. *Staff*

316. *Directed Teaching in Physical Therapy*. 1 to 3 units. *Staff*

320. *Sensorimotor Mechanisms Related to Rehabilitation*. Development of normal motor behavior, structural and functional organization of the nervous system related to methods of facilitating functional capacities for performing the activities of daily living. 2 to 3 units. *Jacobs and Villanueva*

322. *Case Conferences in Rehabilitation*. Observation and demonstration of care of patients with extensive disability; emphasis on integration of health services for comprehensive care via the case conference approach. 1 to 2 units. *Staff*

332. *Administration of Physical Therapy Services*. Principles of administration, leadership styles and management roles; organization of health care facilities with special emphasis on administration of physical therapy services. 3 units. *Staff and Special Lecturers*

334. *Community Health*. Principles of comprehensive health care; political, economic, and cultural aspects of the organization of health care systems; elements of biostatistics in physical therapy sciences. 2 to 3 units. *Kaiser, Staff, and Special Lecturers*

341-342. *Advanced Seminar—Selected Problems*. 2 to 3 units. *Staff*

350. *Research*. Units by arrangement. *Staff*

Physics

Professor Fairbank, *Chairman* (119 Physics Building); Associate Professor Evans, *Director of Graduate Studies* (213 Physics Building);

Professors Biedenharn, Fowler, Gordy, Greuling, Lewis, Meyer, Newson; Adjunct Professors Robl and Way; Associate Professors Bilpuch, Roberson, Robinson, and Walter; Assistant Professors Binkley, Dzubay, Carpenter, Cook, Fortney, Lipshutz, Han, Poore, Rose, and Sykes

The Department of Physics offers graduate work for students wishing to earn the A.M. or Ph.D. degree. In addition to a balanced program of basic graduate courses, the department offers specialized courses and seminars in several fields of high current interest, in which research is being done by students, faculty, and staff.

With the help of faculty advisers, each student selects a course program to fit his needs, including work in a minor field, usually mathematics or chemistry. Students are encouraged to begin research work early in their career.

The department does not ordinarily accept students for work toward the A.M. degree only, and students making good progress are advised to work directly for the Ph.D. The option of taking the A.M. without thesis is available, with the approval of a departmental committee.

A reading knowledge of one language, usually chosen from French, German, or Russian, is required for the Ph.D. degree.

For Seniors and Graduates

*209. *Introduction to Solid State Physics*. Description of basic physical processes in solids with emphasis on dielectrics, metals, and semiconductors. Introduction to crystal structure and thermal and magnetic properties. 3 units.

215. *Introduction to Quantum Mechanics*. Wave mechanics and elementary applications; the hydrogen-like atoms; electron spin and angular momentum; operators and eigenvalues; stationary state perturbation theory; identical particles. Prerequisites: Physics 162, 182 or equivalents; Mathematics 285-286 may be taken concurrently. 3 units. *Evans*

217-218. *Advanced Physics Laboratory*. Measurements involving the fields of mechanics, electricity, magnetism, heat, sound, optics and modern physics, 2-6 units. *Meyer*

220. *Advanced Electronics*. Vacuum tubes and solid state devices, advanced circuit analysis. 3 units. *Roberson*

*221-222. *Theoretical Physics*. Mechanics of particles and of rigid bodies, elasticity, fluids dynamics, electrodynamics; optics, relativity, thermodynamics, statistical mechanics, wave mechanics. Prerequisite: Mathematics 285-286 or equivalent to be taken at least concurrently. 6 units.

223-224. *Electricity and Magnetism*. Electrostatics, magnetostatics, and potential theory; dielectric and magnetic media; magnetic field of cur-

*Offered on demand.

rents and the law of induction. Maxwell's electrodynamics. 6 units.
Carpenter

For Graduates

302. *Advanced Mechanics*. The fundamental principles of Newtonian mechanics; general dynamics of systems of particles and rigid bodies; the methods of Lagrange and Hamilton; generalized mechanics. 3 units.
Fortney

303, 304. *Thermodynamics, Statistical Mechanics*. Fundamental laws of thermodynamics and statistical mechanics with applications to physics and chemistry. Properties of gases and elements of quantum statistics. 6 units. *Sykes*

305. *Introduction to Nuclear Physics*. Phenomenological aspects of nuclear physics; interaction of gamma radiation and charged particles with matter; nuclear detectors; particle accelerators; radioactivity; basic properties of nuclei; nuclear systematics; nuclear reactions, particle scattering; nuclear models; the deuteron; nuclear forces; parity. 3 units.
Walter

*306. *Low Temperature Physics*. The properties of matter near the absolute zero of temperature; superconductivity, liquid helium, adiabatic demagnetization. Prerequisite: Physics 303. 3 units. *Fairbank*

308. *Introduction to High Energy Physics*. Cosmic rays; mechanisms of energy loss by very high energy particles; accelerators; present status of strong and weak interactions; parity; charge conjugation violation. 3 units. *Fowler*

309. *Solid State*. Matter in the condensed state, including metals, insulators and semiconductors; theory of cooperative effects; thermal and magnetic properties of matter. Prerequisite: Physics 303. 3 units.
Sykes

*310. *Advanced Solid State Physics*. Scattering from many particle systems; Fermi liquids; systems of bosons; superconductivity. Prerequisite: Physics 316. 3 units.

316. *Principles of Quantum Theory*. Original and fundamental concepts of quantum theory; wave and matrix mechanics; theory of measurements; exclusion principle and electronic spin. Prerequisite: Physics 202. 3 units. *Han*

317. *Intermediate Quantum Theory*. General operator methods; angular momentum; Dirac electron theory. Second quantization; symmetry principles and conservation theorems. Applications to the theory of solids, of nuclei, and of elementary particles will be stressed. Prerequisite: Physics 316. 3 units. *Biedenharn*

318-319. *Electromagnetic Field Theory*. Electrodynamics; theory of wave optics; radiation of electric and magnetic multipole fields; special

*Offered on demand.

relativity; covariant electrodynamics; Lienard-Wiechert potentials; scattering and dispersion; Hamiltonian field equations. Prerequisite: Physics 223. 3 units. *Greuling*

*330. *Nuclear Structure Theory*. Two body nuclear forces used to describe nuclear structure; nuclear shell and collective models; properties of nuclear levels; magnetic and quadrupole moments; transition probabilities; nucleon-nucleon scattering; nuclear reactions. Prerequisites: Physics 305 and 316. 3 units.

*331. *Microwave Radiation*. Microwave generators, cavity resonators, transmission lines, radiation propagation, and detection. 3 units. *Gordy*

*335. *Microwave Spectroscopy*. Application of microwaves in the determination of molecular, atomic, and nuclear properties. Stark and Zeeman effects in microwave spectroscopy. Magnetic resonance absorption. 3 units. *Gordy*

*341. *Advanced Topics in Quantum Theory*. Introduction to relativistic quantum field theory; Lorentz and Poincare groups; quantization of free fields; interacting fields and S-matrix; applications to quantum electrodynamics and dispersion relations. Prerequisite: Physics 317. 3 units. *Han*

*342. *Theory of Elementary Particles*. Theoretical methods used in treating particle interactions, emphasizing phenomenological treatments. Quantum field theory and dispersion theory is developed as needed. Applications in the general areas of pion physics, electromagnetic interactions of hadrons, strange particle interactions, and weak interactions are surveyed. Prerequisite: Physics 316. 3 units. *Evans*

*343. *Nuclear Physics*. Elementary theory of the deuteron; low energy neutron-proton scattering; theory of nuclear reactions; penetration of potential barriers; nuclear energy levels. Prerequisite: Physics 215. 3 units. *Newson*

*344. *Advanced Nuclear Physics*. The deuteron, nuclear forces, scattering of elementary particles, beta-radiation. Other aspects of nuclear physics susceptible of theoretical interpretation. 3 units. *Biedenharn*

*345. *High Energy Physics*. Experimental and theoretical aspects of high energy nuclear processes; properties of mesons and hyperons. 3 units.

*346. *Topics in Theoretical Physics*. The content of this course will vary from year to year. General methods in quantum mechanics such as: group theory and its applications; elementary particle theory; field theory; theory of solids; theoretical nuclear physics; atomic and molecular structure. Prerequisite: Physics 316, 317. 3 units.

351-352. *Seminar*. A series of weekly discussions on topics related to

*Offered on demand.

the research projects under investigation in the department. 2-4 units. *Members of the Graduate Staff*

Physiology and Pharmacology

Professor Tosteson, *Chairman* (388 Medical Sciences I); Associate Professor Padilla, *Director of Graduate Studies* (340 Medical Sciences I); Professors Bernheim, Blum, Brauer, Bressler, Jöbsis, Johnson, Moore, Narahashi, and Renkin; Associate Professors Lack, Long, McManus, Ottolenghi, Salzano, Schanberg, Somjen, and Wolbarsht; Assistant Professors Anderson, Andreoli, Brendel, Fellows, Gutknecht, Hersey, Lauf, Lieberman, Meezan, Mendell, Mills, Palmer, Posner, Schomberg, and Wachtel; Visiting Professor Schoffeniels

In the Department of Physiology and Pharmacology graduate work is offered leading to the A.M. and Ph.D. degrees. Before undertaking graduate work in physiology or pharmacology a student should have a strong background in basic science including course work in mathematics, chemistry, physics, and biology. Students are accepted for graduate work who have undergraduate majors in any of the following areas: biology, chemistry, physics, engineering. A brochure is available from the department which describes the program of study, financial assistance, facilities, and the research activities of the staff.

M200. *Introductory Physiology*. An introduction to the basic concepts of physiology with particular reference to man. Three lectures, one laboratory, and one conference per week. Fall term. 6 units. *All Members of the Graduate Staff*

M201. *Pharmacology: Mode of Action of Drugs*. Studies and discussion of the pharmacological action of drugs in terms of biochemical and physiological processes. Lectures, conferences, and laboratory. Prerequisite: M200 or equivalent. 4 units. *All Members of the Graduate Staff*

M210, 211. *Individual Study and Research*. Directed reading and research in physiology and pharmacology. Prerequisites: senior standing and permission of the Director of Graduate Studies. 3-9 units. *Staff*

M258. *Environmental and Underwater Physiology and Pharmacology*. General physiological problems involved in penetration of man into the ocean including confinement, cold, exotic atmospheres, pharmacological and mechanical aspects of respiration at high pressures, inert gas narcosis, prolonged immersion, and effects of pressure on nerve and contractile tissue. 4 units. *Brauer and Staff*

M279. *Student Tutorial in Physiology and Pharmacology*. An introduction to critical reading of selected papers in physiology or pharma-

cology. Required of all first-year graduate students. 2 units. *All Members of the Graduate Staff*

M280. *Student Seminar in Physiology and Pharmacology*. Readings and discussions in depth of several aspects of physiology and pharmacology. Required of all second-year graduate students. 2 units. *All Members of the Graduate Staff*

M372. *Research*. Individual investigations in the various fields of physiology and pharmacology. Credits to be arranged. *All Members of the Graduate Staff*

M383. *Physiological Instrumentation*. Electronic methods of measurement of physiological variables. The operational amplifier is used as the active building block in appropriate feedback circuits containing only passive elements to make a wide range of linear instruments including analog computers. Digital logic and computing elements are also developed. (Offered in alternate years beginning 1971.) 3 units. *Moore and Staff*

M384. *Analysis of Physiological Systems*. Several physiological systems will be analyzed in detail using a combination of classical mathematical analysis, model-building, and newer analog and digital techniques. Topics to be covered include diffusion processes, steady state and transient kinetics, and cable equations. (Offered in alternate years beginning 1972.) 3 units. *Moore, Blum, and Staff*

M387. *Cardiovascular and Respiratory Physiology & Pharmacology I*. Selected topics in the physiology and pharmacology of cardiac muscle and the peripheral circulation, including general and comparative morphology and ultrastructure of cardiac muscle, some aspects of developmental physiology, cardiac electrophysiology and mechanics, excitation-contraction coupling, and peripheral circulatory control. 2 units. *Johnson and Staff*

M389. *Cardiovascular and Respiratory Physiology & Pharmacology II*. Primary emphasis is on various aspects of the physiology of respiration. Topics covered include pulmonary mechanics, central and peripheral regulation of ventilation, pulmonary circulation and respiratory responses to exercise, altitude, and hyperbaric environments. 2 units. *Salzano and Staff*

M391. *Neurophysiology and Neuropharmacology I*. Structure and function of excitable membranes; impulse generation and conduction in different kinds of nerve; effects of pharmacological agents on electrical properties; physiological and pharmacological aspects of synaptic and neuromuscular transmission; biophysics of receptor cells. Clinical applications will be discussed. 3 units. *Narahashi and Staff*

M393. *Neurophysiology and Neuropharmacology II*. Physiology of sense organs; sensory coding in the CNS; integration in simple neural nets; motor functions of the CNS; effects of drugs on central neural func-

tion; physiological aspects of memory. Clinical applications will be discussed. 3 units. *Somjen and Staff*

M394. *Marine Membrane Physiology*. Physiology of marine and estuarine organisms, with emphasis on cellular transport processes. The course will include the mechanisms, functions, and comparative aspects of ionic and osmotic regulation in marine plants and animals. Course to be offered at Duke Marine Laboratory, Beaufort, North Carolina. Prerequisite: permission of instructor. 6 units. *Gutknecht, Schoffeniels, and Staff*

M395. *Biochemical Pharmacology I*. Emphasis on mechanism of action of drugs in the areas of (1) metabolism and toxicology; (2) antibiotics; (3) steroids; (4) antimetabolites and oncolytic agents; (5) embryology and development; (6) hematopoietic system and porphyrins; (7) lipids and carbohydrates; (8) membrane structure and function; (9) ground substance (mesenchyme). Lectures will correlate the material in terms of clinical significance. (Also listed as Biochemistry 395.) 2 units. *Bressler, Brendel, Lack, Palmer, Posner, Elford, Kirshner, and Kamin*

M396. *Biochemical Pharmacology II*. Emphasis on mechanism of action of drugs in the areas of (1) metabolism and toxicology; (2) antibiotics; (3) steroids; (4) antimetabolites and oncolytic agents; (5) embryology and development; (6) hematopoietic system and porphyrins; (7) lipids and carbohydrates; (8) membrane structure and function; and (9) ground substance (mesenchyme). Lectures will correlate the material in terms of clinical significance. (Also listed as Biochemistry 396.) 2 units. *Bressler, Brendel, Lack, Meezan, Posner, Kirshner, and Kamin*

M397. *Cellular and Chemical Pharmacology I*. Chemical aspects of cell-drug interaction. Structure activity relationships. Drug action on complex biological systems. 2 units. *Ottolenghi and Wilder*

M398. *Cellular and Chemical Pharmacology II*. Cholinergic mechanisms, pharmacological and applied aspects. Biogenic amines, pharmacological and behavioral aspects and their relationship to disease. Psychoactive drugs. Pharmacology of excitable tissues. 2 units. *Ottolenghi, Bernheim, Narahashi, and Schanberg*

M401. *Metabolic and Developmental Physiology and Pharmacology*. Cell division and control of the cell cycle; population dynamics; physiology of subcellular organelles such as nuclei, mitochondria, lysosomes, and peroxisomes; metabolic regulation with respect to temperature adaptation and to variations in exogenous substrates; control of development and differentiation in eucaryotic cells. 3 units. *Blum, Padilla, and Staff*

M403. *Endocrinology and Reproduction*. Current concepts of biosynthesis, secretion, and mechanisms of action of hormones. Structural relationships and endocrine regulation at cellular, organ, and higher

integrative levels. Structure and function of male and female reproduction systems including hormonal mechanisms in pregnancy and parturition. (Also listed as Anatomy 403.) 3 units. *Fellows, Everett, and Anderson*

M405. *Contractile Processes in Physiology and Pharmacology*. Cellular basis of activity in skeletal, cardiac, and smooth muscle; submicroscopic structure of muscle and the molecular basis of contraction; electrical and ionic properties of muscle membranes; the problem of electromechanical coupling; mechanics and thermodynamics of muscular contraction; biochemical energies of contraction; control mechanisms used for movement in various animals. 3 units. *Johnson, Jöbsis, and Staff*

M407. *Membrane Transport Processes in Physiology and Pharmacology I*. Chemical composition and ultrastructure of biological membranes, physical chemistry of transport processes, use of drugs to modify and elucidate membrane transport processes, role of such processes in physiology of individual cells, integration of transport processes to produce movement of molecules across epithelia, e.g., amphibian skin and bladder. 2 units. *Tosteson and Staff*

M409. *Membrane Transport Processes in Physiology and Pharmacology II*. The function of organs specialized for transport, such as the gastric and intestinal mucosa, the liver, and the kidney, in terms of the facts and concepts of membrane physiology. 2 units. *Tosteson and Staff*

Political Science

Professor Hallowell, *Chairman* (215 Library); Professor Ball, *Director of Graduate Studies* (2114 Campus Drive); Professors Braibanti, Cole, Hall, Kornberg, Kulski, Leach, Proctor, and Thomas; Associate Professor Cook; Assistant Professors Braithwaite, Fish, and Spragens; Adjunct Professor Grzybowski; Visiting Lecturer Smith

The Department of Political Science offers graduate work leading to the A.M. and Ph.D. degrees. Before being admitted to candidacy for the Ph.D. degree, an applicant is normally expected to have qualified for the A.M. degree.

Instruction is designed to prepare the student for teaching and research, for government service, and for other work related to public affairs. Before undertaking graduate study in political science, a student is ordinarily expected to have completed at least 12 semester hours of course work in political science, including some work in American government.

Fields in which instruction is at present offered are American government and politics (including constitutional law, public administration,

the legislative and judicial processes, and state and local government); comparative government and politics (including Western Europe, Southern Asia, Latin America, Africa, the Soviet Union, and the Commonwealth); political theory; and international relations (including international law and international organization).

The candidates for the master's degree are required to show proficiency in one modern foreign language and to submit either a thesis or thesis equivalent. The latter option is open only to students going on for the Ph.D. The thesis equivalent is defined as a major research paper substituted for the thesis on recommendation of the student's supervisor and with the approval of the Director of Graduate Studies.

The candidate for the degree of Doctor of Philosophy in political science must elect four fields, at least three of which must be selected from the fields enumerated above and one of which may be in a related department. He must also demonstrate a reading knowledge of two foreign languages which have been approved by the professor who supervises his dissertation, or he must demonstrate proficiency in one such foreign language and in the use of another research tool such as statistics. The latter alternative is permitted only with the approval of the dissertation supervisor.

For Seniors and Graduates

207. *American Constitutional Interpretation*. Development of the Constitution of the United States through Supreme Court decisions. 3 units. *Fish*

209. *Problems in State Government and Politics*. Special attention is given to federal-state and interstate relations and to the influence of party systems on the operation of state governments. 3 units. *Leach*

214. *Comparative Administrative Law*. Comparative analysis of the role of administrative law and administrative techniques in established and transitional constitutional systems. Emphasis on French, German, British, and American patterns. Control of legality and expediency of various types of judicial review will be discussed. 3 units. *Grzybowski*

220. *Problems in International Politics*. Among the topics considered are nuclear power, bipolarity and polycentrism, nationalism, national interests and ideology, the revolution of modernization, and regional integration. 3 units. *Kulski*

221. *International Organization: The United Nations*. A study of the structure and functioning of the United Nations organs and of related specialized agencies. 3 units. *Ball*

†222. *Empirical Theory*. Emphasis is on the construction of empirical theory, particularly conceptualization, hypothesis formation, and testing.

†Not offered in 1970-71.

Careful consideration is given to the logic of data collection and processing. 3 units.

†223. *Political Philosophy from Plato to Machiavelli*. An intensive analysis of the political philosophies of Plato and Aristotle followed by a survey of medieval political thought and an analysis of the significance of Machiavelli. (Offered in alternate years.) 3 units. *Hallowell*

224. *Modern Political Theory*. An historical survey and philosophical analysis of political theory from the beginning of the seventeenth to the middle of the nineteenth century. Attention is given to the rise of liberalism, the Age of Enlightenment, the romantic and conservative reaction, idealism, and utilitarianism. 3 units. *Hallowell and Spragens*

225. *Comparative Government and Politics—Western Europe*. Modern political institutions and processes in Western Europe. 3 units. *Cole*

227. *International Law*. Elements of international law, particularly as interpreted and applied by the United States; rights and duties of states with respect to recognition, state territory and jurisdiction, nationality, diplomatic and consular relations, treaties, treatment of aliens, pacific settlement of disputes, international regulation of the use of force, and collective responsibility. 3 units. *Grzybowski*

229. *Recent and Contemporary Political Theory*. The rise of positivism and its impact upon modern political thought, the origins of socialism, Marxism and its variants, socialism in the Soviet Union, nationalism, Fascism and National Socialism, the crisis in modern democracy, Christianity and the social order. 3 units. *Hallowell*

230. *American National Government*. A study of the formation, development, and contemporary operation of the national political system. The course employs both historical and behavioral approaches. 3 units. *Thomas*

231. *American Political Theory*. An analysis of the main currents in American political thought from colonial beginnings to the present day, with emphasis upon the development of liberalism in America. 3 units. *Cook*

233. *Research Methodology*. The research process in political science with emphasis on the quantitative analysis of data. 3 units. *Braithwaite*

†235. *The Commonwealth*. An analysis of the political relationship between the members of the Commonwealth and a comparative study of the political systems of the Commonwealth countries, with particular reference to Canada. A course designed in part to utilize the occasional services of visiting professors from Commonwealth countries. 3 units. *Cole*

237. *Problems in American Foreign Policy*. The decision-making process as applied to contemporary foreign policy issues. (Offered in

†Not offered in 1970-71.

alternate years.) Prerequisite: Political Science 122 or the equivalent. 3 units. *Ball*

241. *Public Administrative Organization and Management*. An examination of the American administrative process, with emphasis upon the theory and practice of administrative organization and management. 3 units. *Hall*

243. *Administrative and Organizational Theory and Behavior*. A behavioral analysis of public bureaucracies in the United States. (Offered in alternate years.) 3 units. *Thomas*

†244. *Administrative Law and Process*. The nature and law of the administrative process in the context of American government and politics, with special attention to the powers, procedures, and judicial control of administrative agencies. 3 units. *Hall*

†246. *Public Administration and Public Policy*. An analysis of the role of the administrative official as a policymaker in modern politics. Consideration is given to the problems which public officials encounter, the factors which influence their actions and means of rationalizing policy-making behavior. (Offered in alternate years.) 3 units. *Thomas*

249. *Comparative Political Analysis and Political Development*. General methodology of comparison of political systems. Institutional, structural, functional, and configurative modes of analysis. Theory of political development. Theoretical problems of induced political change. 3 units. *Braibanti*

250. *Comparative Government and Politics—Southern Asia*. Political development of India and Pakistan. Contextual determinants of the political systems. Political consequences of partition. National integration, constitutional and institutional aspects of the political systems. Impact of foreign technical assistance. 3 units. *Braibanti*

253. *Comparative Government and Politics—Latin America*. A study of politics and government in selected Latin American states, including Argentina, Brazil, Chile, and Mexico. Political forces and their impact upon governmental institutions. 3 units. *Ball*

275. *The American Party System*. An intensive examination of selected facets of American national political parties, such as relationships between presidential and congressional politics, the politics of national conventions, and the controversy over party government. 3 units. *Kornberg*

†277. *Comparative Party Politics*. A critical evaluation of the literature concerned with the impact of social and political systems on party structures, functions, ideologies, and leadership recruitment. Emphasis upon research techniques and objectives. (Offered in alternate years.) 3 units. *Kornberg*

279. *The Legislative Process*. A behavioral analysis of the American

†Not offered in 1970-71.

legislative process with emphasis on Congress. Some consideration will also be given to legislatures in other countries. 3 units. *Braithwaite*

280. *Comparative Government and Politics—Sub-Saharan Africa*. Particular attention will be given to traditionalism and modernization, ideologies, leadership, party systems, the adaptation of parliamentary institutions, Africanization of the civil services, and the problem of political integration. 3 units. *Smith*

285. *The Judicial Process*. A study of judicial decision-making in the United States. Attention will be focused on the institutional setting and the process of litigation, the recruitment and political socialization of judges, the influences and limitations on judicial decision-making, and the impact of judicial decisions within the political system. Prerequisites: Political Science 127, 207, or their equivalents. 3 units. *Fish*

291. *Problems in Urban and Metropolitan Government*. An analysis of problems arising from the structure and functions of urban governments in the United States with particular attention to the problems of governing metropolitan areas. 3 units. *Leach*

†293. *Federalism*. A study of both the theoretical and the operational aspects of federalism, with particular emphasis on their application in the American governmental system. (Offered in alternate years.) 3 units. *Leach*

For Graduates

†310. *Seminar in State and Local Government*. Prerequisite: Political Science 209 or its equivalent. 3 units. *Leach*

312. *Seminar in Constitutional Law*. Prerequisite: Political Science 207 or equivalent. 3 units. *Fish*

321. *Seminar in Political Theory*. (Offered in alternate years.) Prerequisite: six units in Political Science 223, 224, 229, 231 or their equivalents. 3 units. *Hallowell*

†325. *Seminar in Comparative Government and Politics*. (Offered in alternate years.) Prerequisite: six units in Political Science 225, 249, 250, 251, 253, 280 or their equivalents. 3 units. *Cole*

328. *Seminar in International Law*. Open to students who have completed course 227 or its equivalent. 3 units. *Grzybowski*

†329. *Seminar in International Regional Organization*. Offered in alternate years.) Prerequisite: Political Science 221 or its equivalent. 3 units. *Ball*

†330. *Seminar in Comparative Government and Politics—Southern Asia*. Emphasis on research using documentary materials relating to India, Pakistan, Ceylon, and Malaya. (Offered in alternate years.) Prerequisite: Political Science 250, 251 or their equivalents. 3 units. *Braibanti*

†Not offered in 1970-71.

†341. *Seminar in Public Administration*. Selected topics in administrative and organizational theory and behavior. Prerequisite: Political Science 141 or 243. 3 units. *Thomas*

342. *Seminar in American National Government and Politics*. Prerequisite: Political Science 230 or its equivalent. 3 units. *Thomas*

†343. *Seminar in the Policy Process*. Selected topics covering the theory, methodology, and practice of policy formation in American politics. Prerequisite: Political Science 246 or its equivalent. 3 units. *Thomas*

360. *Seminar in Government and Politics in the Soviet Union*. Prerequisite: Political Science 165, or on individual approval. 3 units. *Kulski*

361. *Seminar in Foreign Relations of the Soviet Union*. Prerequisite: Political Science 165 or 360, or on individual approval. 3 units. *Kulski*

376. *Seminar in Comparative Political Behavior*. (Offered in alternate years.) Prerequisites: Political Science 275 or 277 or their equivalents, or by special approval of the instructor. 3 units. *Kornberg*

377. *Seminar in Canadian Political Behavior*. Analysis of institutional processes and political behavior in Canadian society with special reference to the impact of multi-partyism, parliamentarism, political, and cultural particularism, and the elite structure. (Offered in alternate years.) Prerequisite: Political Science 235 or 277, or by special approval of the instructor. 3 units. *Kornberg*

380. *Seminar in African Government and Politics*. Prerequisite: Political Science 280 or its equivalent. 3 units. *Proctor*

381. *Seminar in Latin American Government and Politics*. Prerequisite: Political Science 253 or the equivalent. (Offered in alternate years.) 3 units. *Ball*

401. *Seminar in the Commonwealth*. 3 units. *Cole, Preston, Spengler, and Braibanti*

Related Course Work in the School of Law

There may be graduate credit for course work completed in the Duke University School of Law, under regulations referred to on page 57 of this *Bulletin*.

Psychology

Professor Alexander, *Chairman* (224 Psychology-Sociology Building); Associate Professor Lockhead, *Director of Graduate Studies* (242 Psychology-Sociology Building); Professors Brehm, Carson, Diamond, Guttman, Jones, Lakin, and Wallach; Associate Professors Altrocchi, Borstelmann, R. Erickson, Linder, Schiffman, and Wing; Associate Research Professor Gaffron; Assistant Professors Costanzo, C. Erickson, Kramer,

†Not offered in 1970-71.

Kremen, Staddon, and Wortman; Lecturers Clifford, E. Crovitz, H. Crovitz, Eisdorfer, Feather, Gehman, Huse, Kinsbourne, Krugman, Obrist, Peele, Shows, Somjen, Thompson, and Wolbarsht

The department offers work leading to the Ph.D. degree. The areas of concentration are: theoretical experimental psychology, including physiological and comparative psychology, social psychology, and personality-clinical psychology. All fields of specialization presuppose thorough preparation in the general methods, data, and theories of psychology. Programs of study are typically arranged to provide this common background in the first year or two, with increasing specialization in course work and research in subsequent years. Mastery of any related field, including a foreign language, may be required if it is necessary to the particular program of the student. Early in the second year of residence, the Ph.D. student is expected to have planned his further program of specialized studies; by the end of the second year, when the preliminary examination is normally taken, the doctoral dissertation plan should be formulated. An original dissertation demonstrating independent research competence and scholarship is the most important formal requirement for the Ph.D. degree.

Students specializing in clinical psychology undertake field work in a variety of settings, and an integral part of this program is a one-year internship in an approved and appropriate institution. Clinical internship is arranged for the third year of study or a later year, depending on the student's progress and needs.

Related work in a variety of fields is available. The areas most relevant to graduate work in psychology are the biological sciences (zoology, neuro-anatomy, physiology), mathematics and statistics, sociology and anthropology, and philosophy of science. Basic preparation in statistics and quantitative methods is normally obtained in the Department of Mathematics.

Further details concerning the program of studies in psychology may be obtained from the Director of Graduate Studies in Psychology.

203. *Sensation and Perception*. An examination of the classical concepts in sensation and perception and of the resulting psychophysical data for each of the major senses with emphasis on vision and audition. Modern perceptual formulations are discussed through analysis of the empirical evidence in support of each view. 3 units. *Lockhead*

†204. *Comparative Psychology*. An analysis of the ontogeny, evolution, adaptive significance, and physiology of animal behavior. 3 units. *C. Erickson*

210. *Cognition and Higher Mental Processes*. An analysis of selected research in thinking, problem solving, creativity, language, and related topics. 3 units. *Wortman*

†Not offered in 1970-71.

211. *The Problem Child*. See Education 211.

213. *Principles of Conditioning*. An examination of the research literature in operant and respondent conditioning. 3 units. *Staddon*

215. *Developmental Psychology*. An examination of theoretical issues in identification, regression, and cognitive, moral, and motivational development. 3 units. *Kramer and Staff*

216. *Biological Psychology*. The methods of biology (as applied to psychology), especially in neurophysiology, neuroanatomy, and genetics. Topics covered include: (a) the genetics of behavior, (b) the organization of the dorsal thalamus and neocortex, and (c) the limbic system and hypothalamus. Methods covered include: (a) ablation method, (b) method of evoked potentials, (c) electrical stimulation of the brain, and (d) classical and physiological genetics. 3 units. *Diamond*

217. *Social Psychology*. An examination of selected problem areas in social psychology including social factors in cognition, models of social interaction, conformity and social influence, and attitude development and change. Recent research is emphasized in relation to its historical context and its bearing on the development of theory. 3 units. *Jones*

218. *Research Methods in Social Psychology*. The theory and practice of data collection methods in social psychology. Emphasis is on the interplay between experimental design and technique. 3 units. *Linder*

219. *Physiological Psychology I*. The structure and function of the nervous system as related to problems of sensory-motor processes and learning. 3 units. *R. Erickson*

220. *Physiological Psychology II*. Examination of the role of nervous mechanisms and hormones in the control of goal-directed behavior and emotion. 3 units. *C. Erickson*

234. *Seminar in Personality*. A detailed consideration of selected research topics of current interest in the experimental study of personality, including risk-taking, creativity, and cognitive styles. 3 units. *Wallach*

†236. *Theoretical Psychology*. Survey of representative systematic formulations and schools in historical sequence. Study of relationships between various philosophical, scientific, and cultural thought-patterns and the forms of psychological theories. 3 units. *Guttman*

238. *The Electroencephalogram and Psychological Function*. A survey of experimental and clinical literature on brain wave correlates of intelligence, personality, behavior disorders, epilepsy, sleep, sensory stimulation, conditioning, and learning. Lectures, laboratory demonstrations, and clinical case presentations. 3 units. *Obrist*

239. *Behavioral Correlates of Brain Damage in Man*. A study of the effects of brain damage on psychological functioning. Known brain-behavior relationships in man will be reviewed, and problems encountered in the study of brain function in man will be emphasized. Laboratory

†Not offered in 1970-71.

demonstrations will be concerned with the assessment of cerebral dysfunction through the use of standard psychological tests. 3 units. *Thompson*

245. *Personality Theory I*. An examination of representative theories of human functioning from Freud through depth and neoanalytic approaches. 3 units. *Alexander or Kremen*

246. *Personality Theory II*. An examination of representative models of human functioning from among such approaches as that of field theory, behavior theory, type or trait theory, and ego psychology. 3 units. *Alexander or Kremen or Schiffman*

271. 1-4. *Seminar in Selected Problems*. 3 units each. *Staff*

273. *Principles of Psychological Measurement*. Measurement theory and the problems of scientific inference. Topics will include methods of data analysis, psychometric scaling and test construction. Prerequisite: Mathematics 232 or equivalent. 3 units. *Schiffman*

282. *Introduction to Methods in Psychotherapy*. Current trends in psychotherapeutic practice and research. Emphasis is on the application of principles drawn from theories of personality to individual and group psychotherapy. Includes some field experience in therapy. 3 units. *Lakin and Carson*

291. *Seminar in Community Mental Health*. A study of psychological epidemiology and ecology; primary, secondary, and tertiary prevention; and the public health approach to problems of psychological well being. Focus on intervention techniques, such as consultation and community action planning. 3 units. *Altrocchi*

292. *The History of Psychology*. 3 units. *Guttman*

293. *Methods in Developmental Psychology*. Methodological and epistemological issues in research in development. Individual and group research projects are an integral part of the course. 3 units. *Staff*

For Graduates

305. *Psychopathology*. An examination of behavior disorders, with particular emphasis on explanatory concepts and the evidence from research in this field. 3 units. *Feather*

306. *Seminar in Developmental Psychology*. Selected topics in cognitive, emotional and social development. 3 units. *Staff*

309. *Seminar in Learning*. Selected topics in operant conditioning and discrimination learning. 3 units. *Staddon*

310. *Seminar in Perception*. 3 units. *Lockhead*

*311. *Seminar in Instrumental Behavior*. 3 units. *Guttman*

*313. *Seminar on the Concept of the Reflex*. A consideration of the reflexological principles found in the works of Sherrington, Sechenov, Pavlov, Eccles, Skinner, Konorski, *et al.*, and an examination of the cri-

*Offered on demand.

tiques of Goldstein, Lashley, and others. 3 units. *Diamond and Guttman*

316. *Seminar in Social Psychology*. 3 units. *Jones*

317. *Seminar in Social Behavior*. 3 units. *Linder*

318. *Seminar in Social Influence*. 3 units. *Brehm*

324. *Seminar: Behavioral Studies of the Brain*. Selected topics in the neural bases of behavior. 3 units. *R. Erickson and Diamond*

325. *Seminar in Neuroendocrinology and Behavior*. Selected problems in the study of hormones and neurohumors as they are related to such areas as reproductive behavior, sleep, and emotion. 3 units. *C. Erickson*

335-336. *Clinical Psychology Practicum*. Seminar discussion and supervised field experience in the application of basic psychological procedures and principles to clinical cases in a variety of institutional settings. Prerequisite: Psychology 245, 246, 347, and 348. 1 to 6 units in each of two semesters. *Staff*

337. *Seminar in Sensory Discrimination*. The neural bases of discrimination in vertebrates and invertebrates is studied by neurophysiological, electrophysiological, and psychophysical techniques. 3 units. *R. Erickson and Wolbarsht*

340. *Group Processes and Sensitivity Training*. 3 units. *Lakin*

343, 344. *Advanced Seminar in Clinical Psychology*. 1 to 3 units each semester. *Staff*

347-348. *Personality Assessment*. Introduction to the assessment of human personality through the study of personal documents, interview data, objective and projective test material. Laboratory sessions will be concerned with personality assessment of normal human subjects over extended time periods. 6 units. *Alexander or Kremen*

Religion

Professor Young, *Director of Graduate Studies* (209 Divinity School); Professors Baker, Beach, Cushman, Davies, Henry, Herzog, Hillerbrand, Lacy, Langford, Petry, Poteat, Price, Stinespring; Associate Professors Clark, Osborn, Robinson, Smith, Tucker, and Wintermute; Assistant Professors Meyers and Parton

The Department of Religion offers graduate work leading to the A.M. and Ph.D. degrees. Students may major in one of three fields: (1) Biblical studies; (2) historical studies; and (3) systematic and contemporary studies. They will be expected to take such courses in one or both of the other fields as will conduce to an adequate understanding of their chosen fields of specialization.

In addition to course work in these major fields, students will take such

other courses in cognate fields as will contribute to the enrichment of their major studies.

This minor requirement may be fulfilled either by work in a cognate department, such as Classical Studies, History, Political Science, or Sociology, or by work in a cognate field within the Department of Religion other than the field of major concentration.

The program of doctoral studies presumes a foundation in religion such as is normally derived from the course content of theoretical subjects of a seminary curriculum. Candidates for admission to the doctoral program are favored, therefore, who hold a B.D. (or equivalent degree) from an accredited seminary or who have had at least two years of seminary study beyond the B.A. degree. Students applying for graduate work in religion directly from an undergraduate program should have had a strong undergraduate major in religion, and will be accepted for the Ph.D. program only on the condition of satisfactory completion of the A.M. degree with the department.

Candidates for the Ph.D. degree must complete the language requirements not later than the beginning of the second year of residence.

Field I. Biblical Studies

201-202. *First Hebrew*. The principles and structure of the Hebrew language with translation of selected Old Testament narratives. 6 units. *Stinespring*

207. *Second Hebrew*. Historical Hebrew grammar with reading and exegesis of Old Testament prose (the Pentateuch and historical books in alternate years). First semester. 3 units. *Staff*

208. *Second Hebrew*. Historical Hebrew grammar with reading and exegesis of Old Testament poetry (the Prophets and the Writings in alternate years). Second semester. 3 units. *Staff*

209. *Biblical Theology*. A study of the Old and New Testaments in regard to their theological relationship. 3 units. *Tucker*

225. *Living Issues in New Testament Theology*. Critical examination of major problems and issues in New Testament interpretation and theology. 3 units. *Smith*

226. *Exegesis of the Greek New Testament I*. A. Mark and Matthew; B. Romans; C. Colossians and Ephesians; D. II Corinthians. (N.T. 226 A, N.T. 226 B, N.T. 226 C, and N.T. 226 D are separate courses, offered in different semesters.) 3 units. *Price, Smith, or Young*

227. *Exegesis of the Greek New Testament II*. A. Luke-Acts; B. Galatians and I Corinthians; C. The Pastoral Epistles; D. The Apocalypse. (N.T. 227 A, N.T. 227 B, N.T. 227 C, and N.T. 227 D are separate courses, offered in different semesters.) 3 units. *Smith or Young*

228. *The Theology of the Gospel and Epistles of John*. A study of the origin of these writings; the provenance of their thought forms and

symbolism; their influence on the early church; and contemporary significance. 3 units. *Price*

258. *Coptic*. Introduction to the Sahadic dialect with selected readings from Christian and Gnostic texts. Prerequisite: at least one year of Greek. 3 units. *Wintermute*

302. *Studies in the Intertestamental Literature*. Selected documents of the Apocrypha and Pseudepigrapha examined exegetically and theologically in their relation to Post-Exilic Judaism. Prerequisite: permission of the instructor. 3 units.

304. *Aramaic*. A study of the Aramaic portions of the Old Testament, and selected passages from the Targums, Midrashes, and Talmuds. 3 units. *Stinespring*

305. *Third Hebrew*. An interpretative study of late Hebrew prose, with readings from Chronicles, Ecclesiastes, and the Mishnah. 3 units. *Stinespring or Davies*

306. *Language and Literature of the Dead Sea Scrolls*. A study in interpretation. Prerequisite: a knowledge of Hebrew. 3 units. *Wintermute*

307. *Syriac*. A study of the script and grammar, with readings from the Syriac New Testament and other early Christian documents. Prerequisite: some knowledge of Hebrew and Aramaic. 3 units. *Stinespring*

309. *History of the Ancient Near East*. A specialized study of the civilizations of Egypt, Palestine, Syria, and Mesopotamia in the light of Biblical archaeology. 3 units. *Stinespring*

310. *Old Testament Prophecy*. The prophetic movement in Israel with special emphasis on the theological standpoint of the prophets of the eighth century B.C. 3 units. *Tucker or Stinespring*

312. *Pauline Theology*. Studies in aspects of Paulinism in the light of recent scholarship. 3 units. *Davies*

314. *Judaism and Christianity in the New Testament*. Their interaction. 3 units. *Davies*

319. *The Gospel According to St. Matthew in Recent Research*. 3 units. *Davies*

340-341. *Seminar in the New Testament*. Research and discussion on a selected problem in the Biblical field. 2 or 3 units. *Price, Smith, or Young*

342. *The Archaeology of Palestine in Hellenistic-Roman Times*. The study of material and epigraphic remains as they relate to Judaism in Hellenistic-Roman times, with special emphasis on Jewish Art. Prerequisite: reading knowledge of Hebrew, Aramaic, and Greek. 3 units. *Meyers*

345. *The Epistle to the Hebrews in Recent Research*. Intensive attention to the text and to secondary sources. 3 units. *Davies*

- 350-351. *Old Testament Seminar*. Research and discussion on selected problems in the Old Testament and related fields. 3 units. *Tucker*
- 401-402. *Colloquium in Biblical Studies*. A colloquium in which all graduate faculty and students in the Biblical division participate. Research papers in the Biblical field are read and discussed.

Field II. Historical Studies

234. *The Theology of St. Thomas Aquinas*. A systematic interpretation of the thought of St. Thomas, with a major emphasis on his specifically theological formulations, drawing upon the *Summa Theologica* and other relevant sources. 3 units.

240. *The Theology of Richard Hooker*. An exposition of the writings of the systematic theologian of Anglicanism in the sixteenth century. 3 units.

250. *The Reformation of the 16th Century*. History and thought of European Christianity between 1517-1555. (Listed also as History 225.) 3 units. *Hillerbrand*

251. *The Age of the Counter-Reformation*. History and thought of European Christianity between 1555 and 1650. 3 units. *Hillerbrand*

252. *Pietism, Deism, and Rationalism*. History and thought of European Christianity between 1650-1800. 3 units. *Hillerbrand*

260. *Seminar: Wesley Studies*. The lives and thought of John and Charles Wesley and their colleagues in relation to English culture and religion in the eighteenth century. 3 units. *Baker*

280. *The History of Religions*. A study of the methodology of the history of religions, the nature of religious experience, and specific categories of religious phenomena. 3 units. *Partin*

283. *Religions of East Asia*. A study of the major traditions of China and Japan with emphasis on the development and expansion of Buddhism. 3 units.

285. *Origins of Indian Civilization*. A study of the main sources and traditions of the classical civilization of the Indian subcontinent, with particular attention to religious movements and institutions. (Also listed as History 285.) 3 units.

296. *Religion on the American Frontier*. A study of the spread of evangelical Christianity as a theological and cultural phenomenon of the American West. 3 units. *Henry*

308. *Greek Patristic Texts*. Critical translation and study of selected Greek texts illustrative of significant aspects of patristic theology and history from the second through the fifth century A.D. 3 units. *Young*

322. *Nineteenth-Century European Theology*. Protestant theology from Kant to Herrman. 3 units. *Herzog*

331. *The Social Message of the Early and Medieval Church*. A study

of the social teachings and contributions of the Christian Church prior to the Protestant Reformation. 3 units. *Petry*

332. *The Medieval Church*. Outstanding characteristics of the medieval Church, emphasizing theory, polity, institutions, sacraments, and worship. 3 units. *Petry*

334. *Church Reformers and Christian Unity*. The work of such reformers as Marsilius of Padua, William of Ockham, Jean Gerson, Pierre d'Ailly, and Nicholas of Cusa in relation to ecclesiastical schism and the search for Christian unity through representative councils. 3 units. *Petry*

335. *The English Church in the Eighteenth Century*. Studies of Christianity in England from the Act of Toleration, 1689, to the death of John Wesley, 1791. 3 units. *Baker*

336. *Christian Mysticism in the Middle Ages*. Source studies in historical perspective of such late medieval mystics as Bernard of Clairvaux, the Victorines, Ramon Lull, Meister Eckhart, Richard Rolle, Catherine of Siena, and Nicholas of Cusa. 3 units. *Petry*

337. *The Theology of Martin Luther*. A critical and comparative examination of Luther's thought. 3 units. *Hillerbrand*

338. *The Theology of John Calvin*. An exposition of the *Institutes of the Christian Religion* in relation to cognate documents. 3 units.

339. *Left-Wing Movements of the Reformation*. A survey of the history and theology of the "radical" Reformation. 3 units. *Hillerbrand*

362. *The Theology of St. Augustine*. A systematic exposition of the thought of St. Augustine, Bishop of Hippo. 3 units.

387. *Christian Ethics and Social Philosophy*. Selected social philosophies from Locke to Sumner analyzed from the standpoint of Christian ethics. 3 units. *Lacy*

391. *Historical Types of Christian Ethics I*. A critical study of representative statements of Christian ethical theory, through the early Reformation. 3 units. *Beach*

392. *Historical Types of Christian Ethics II*. A continuation of C.E. 391, from the Reformation through current Christian ethical theory. Prerequisite: C.E. 391. 3 units. *Beach*

395. *Christian Thought in Colonial America*. Exposition of the main currents in Protestant theology. 3 units. *Henry*

396. *Liberal Traditions in American Theology*. A study of the main types of modern religious thought, beginning with the theology of the Enlightenment. 3 units. *Henry*

Field III. Systematic and Contemporary Studies

210. *Contemporary British Theology*. A study of twentieth-century British Theology. Attention will be given to the Anglican, Free Church, and Scottish traditions. 3 units. *Langford*

230. *The Meaning of Religious Language*. An analysis of the credentials of some typical claims of theism in the light of theories of meaning in recent thought. 3 units. (Also listed as Philosophy 230.) *Poteat*

231. *Seminar in Christianity and Contemporary Thought*. Analytical reading and discussion of such critical cultural analysis as is found in the works of M. Polanyi, Arendt, Trilling, and others, with appraisal of the relevance for theological inquiry. 3 units. *Poteat*

248. *The Theology of Karl Barth*. An historical and critical study of the theology of Karl Barth. Prerequisite: permission of the instructor. 3 units. *Osborn*

281. *Phenomenology and Religion*. Scheler, E. Straus, Merleau-Ponty, Ricoeur, Binswanger, or others to show their bearing upon religious knowledge and practice. Prerequisite: permission of the instructor. 3 units. *Poteat*

292. *Christian Ethics and International Relations*. An examination of Christian attitudes toward such issues as war and peace, the rule of law, foreign aid, and human rights; and the Church's contribution to international policies and institutions. 3 units. *Lacy*

293. *Sociological Analysis of Religion*. An analysis of the way in which various components of a religion (belief-systems, liturgical practices, ethical teachings, institutional structure, and modes of operation) function in relation to social cohesion, social conflict, and social reform. 3 units. *Clark*

294. *Institutional Analysis of Religious Bodies*. A study of the internal structure and dynamics of religious groups. 3 units. *Clark*

295. *Ethics and Economic Life*. A survey of the historical teachings of the Christian churches in the area of economic life, an analysis of contemporary norms of economic justice, and an exploration of current public and private economic policies and the policy-making processes. 3 units. *Clark*

300. *Systematic Theology*. Method and structure of systematic theology, the doctrine of God, theological anthropology, and Christology. 3 units. *Herzog*

303. *The New Hermeneutic and the Concept of History*. A critical examination of key issues in present-day European systematic theology centered in the positions of Fuchs, Ebeling, Moltmann, Ott, and Pannenberg. 3 units. *Herzog*

320. *Hegel and Schleiermacher*. A study of two makers of modern Protestant thought. 3 units. *Herzog*

325. *Philosophical Theology I*. Main problems in the history of philosophical theology from the pre-Socratics to Descartes. 3 units. *Robinson or Cushman*

326. *Philosophical Theology II*. Main problems of philosophical theology in the modern period. 3 units. *Robinson or Cushman*

328. *Twentieth-Century European Theology*. Critical examination of the thought of selected representative theologians. 3 units. *Herzog*

333. *Seminar: Marxist Ideology and Christian Faith*. Comparative study of Communist and Christian doctrines of man, society, sin, history, ethics, and eschatology. 3 units. *Lacy*

380. *Existentialist Thought*. An exploration of the interests and motifs of Existentialism in relation to modern philosophy and theology through an analysis of representative writings of Kierkegaard, Heidegger, Berdyaev, Marcel, and Sartre. 3 units. *Poteat*

385. *Religion in American Literature*. A critical study of the meaning and value of religious motifs reflected in American literature. 3 units. *Henry*

386. *Christianity in Dialogue with Other Faiths*. Contemporary currents of Christian thoughts as they affect resurgent non-Christian faiths, new formulations of a theology of mission, and ecumenical conversations. 3 units. *Lacy*

389. *Christian Ethics and Contemporary Culture*. A study of the interaction between Christian thought and current scholar social theory. 3 units. *Beach*

390. *Current Problems in Christian Ethical Theory*. A critical study of dominant issues in Christian ethics, through an analysis of a variety of contemporary Christian treatments of such problems as love, justice, conscience, and vocation. 3 units. *Beach*

394. *Christianity and the State*. The relation of the Christian theory of the State to political problems, with special consideration of the religious assumptions underlying democratic theory and practice and of the relationship of church to state. 3 units. *Beach*

397. *Contemporary American Theology*. Critical appraisal of major tendencies. 3 units. *Henry*

398. *Colloquium on the College and University Teaching of Religion*. The theological issues of religion in higher education; a consideration of the curricular content of religion courses. Normally expected of Level III students in Fields I, II, and III in residence. *Young and Staff*

Romance Languages

Professor Fein, *Chairman* (205 Foreign Lang.); Associate Professor Cordle, *Director of Graduate Studies* (303 Foreign Lang.); Professors Davis, Dow, Fowlie, Grant, Predmore, Tétel, and Wardropper, Associate Professors Hull and Vincent; Assistant Professor Tate

The Department of Romance Languages offers graduate work leading to the A.M., M.A.T., and Ph.D. degrees in French and Spanish. Require-

ments for the A.M. may be completed by submission of a thesis or by passing a comprehensive examination in the major field. It is hoped that candidates for the A.M. and Ph.D. will minor in a second Romance language; however, minor work may be taken in any one or two of a number of other subject areas.

In order to undertake graduate study in Romance languages, the entering student should have credit for at least 18 semester hours (or equivalent) above the intermediate level in the major language.

French

209. *Advanced Composition and Syntax*. A detailed study of the morphological and syntactic structure of the French language; practice in writing various styles of French; vocabulary study. 3 units. *Hull*

210. *The Structure of French*. Modern French phonology, morphology, and syntax. Readings in current linguistic theory. 3 units. *Hull*

213, 214. *French Literature of the Seventeenth Century*. First semester: its initial phase. Readings in the major literary works to the middle of the century. Second semester: its "classical" phase. Readings in the major literary works from the middle to the end of the century. 6 units.

217. *Mallarmé and Rimbaud*. The symbolism and the formal elements in Mallarmé's poetry. The poetic theory and the psychic elements in Rimbaud's poetry. 3 units. *Fowlie*

219. *Old French Literature*. An introduction to the reading of Old French literary texts. 3 units. *Vincent*

221, 222. *The Nineteenth-Century French Novel*. First semester: the Romantic hero in conflict with society, with special emphasis on the works of Stendhal and Balzac. Second semester: the decline of the individual hero. Flaubert and Zola will receive intensive study. 6 units. *Grant*

223. *French Literary Criticism*. A history of critical theory in France and a study of the major critics from the Renaissance to today. 3 units. *Fowlie*

224. *History of the French Language*. The evolution of French from Latin to its present form; internal developments and external influences. 3 units. *Hull*

225, 226. *From Renaissance to Baroque in French Literature of the Sixteenth Century*. First semester: literary prose. Readings from Jean Lemaire de Belges, Marguerite de Navarre, Rabelais, Montaigne, and others. Second semester: poetry and theater. Readings from Marot, Scève, Labé, Saint Gelais, the Pléiade, d'Aubigné, Sponde, Du Bartas, Garnier, and others. 6 units. *Tétel*

228. *French Poetry of the Twentieth Century*. In the wake of symbol-

ism: Valéry and Claudel; poetry as ritual: Péguy; Apollinaire and surrealist poetry; the contemporary movement: Michaux, Char, Saint-John Perse. 3 units. *Fowlie*

233. *Contemporary French Theater*. A study of dramatic theory; the art of the leading directors; and the major texts of Claudel, Giraudoux, Anouilh, Sartre, Beckett, Ionesco, and Genet. 3 units. *Fowlie*

†234. *Proust*. A study of *A la recherche du temps perdu*. The thematic structure and the aesthetics of the work. 3 units. *Fowlie*

236. *Baudelaire*. A study of the poetry and the criticism of Baudelaire as contributing to the origins of modern art and literature. 3 units. *Fowlie*

241, 242. *French Literature and Thought in the Age of Enlightenment*. First semester: the new philosophy and its propagation. Lectures and discussions involving texts by Fontenelle, Montesquieu, Voltaire, Rousseau, Diderot, and others. Second semester: the crisis in literary aesthetics. Readings, lectures, and discussions bearing on the clash between Classicism and new literary orientations. 6 units.

245, 246. *French Literature of the Twentieth Century*. First semester: to 1935, emphasis on Gide, Mauriac, and Malraux. Second semester: after 1935, emphasis on Sartre, Camus, and the *nouveau roman*. 6 units. *Cordle*

For Graduates

311, 312. *French Seminar*. Each semester one of the following topics will be selected for intensive treatment: (1) studies in sixteenth-century literature, (2) studies in eighteenth-century literature, (3) studies in nineteenth-century literature, (4) studies in seventeenth-century French literature, (5) studies in contemporary literature, and (6) studies in Medieval literature. 3 units each semester. *Cordle, Fowlie, Grant, Tate, Tétel, and Vincent*

— *Graduate Reading Course*. An intensive course in French to develop rapidly the ability to read French in several fields. Graduate students only. No credit.

Italian

For Seniors and Graduates

284. *Dante*. *La Vita Nuova* and a close reading of the *Inferno*. (Conducted in English.) 3 units. *Fowlie*

288. *The Renaissance*. Petrarch, Boccaccio, and Ariosto. 3 units. *Tétel*

†Not offered in 1970-71.

Spanish

For Seniors and Graduates

251. *The Origins of the Spanish Novel*. A critical study, based on close reading and discussion, of selected examples of the principal genres of the early novel: the *Amadís de Gaula*, Diego de San Pedro's *La cárcel de amor*, the *Abencerraje*, the *Lazarillo*, Montemayor's *Diana*. 3 units.

Wardropper

252. *Spanish Lyric Poetry Before 1700*. A critical study, based on close reading and discussion, of selected poems of the Middle Ages, Renaissance, and Baroque. Special emphasis on the *Razón de amor*, *la poesía de tipo tradicional*, and Santillana; on Garcilaso, San Juan de la Cruz, Fray Luis de León, and Herrera; on Góngora and Quevedo. 3 units.

Wardropper

253. *The Origins of the Spanish Theater*. A study of the evolution of the Spanish theater from the *Auto de los Reyes Magos* (12th century) through the end of the sixteenth century. The idea of the theater as dramatic poetry will be stressed; close reading of texts by Gómez Manrique, Encina, Gil Vicente, Torres Naharro, Lope de Rueda, Juan de la Cueva. 3 units. *Wardropper*

255, 256. *Modern and Contemporary Latin-American Literature*. First semester: the coming of age of Latin-American poetry in the nineteenth and twentieth centuries. Second semester: trends in twentieth-century Latin-American fiction. 6 units. *Fein*

257. *Old Spanish*. The historical development of the language together with illustrative readings. 3 units. *Davis*

258. *Old Spanish Literature*. An introduction to the reading of medieval Spanish literary texts. 3 units. *Davis*

259. *Spanish Phonetics*. A phonemic approach to the study of Spanish sounds. Remedial pronunciation drills with special emphasis on rhythm and intonation. Readings in current studies of phonology. 3 units.

Predmore

260. *Advanced Composition and Syntax*. Study of fundamental difficulties in the language; practice in writing idiomatic Spanish; exercises in free composition. For students who have a satisfactory command of Spanish grammar and fair conversational ability. 3 units. *Davis*

261. *Nineteenth-Century Novel*. A study of literary trends in the last half of the nineteenth century. Readings will be selected from the novels of Valera, Pereda, Galdós, Pardo Bazán, Blasco Ibáñez, and their contemporaries. 3 units. *Davis*

†262. *Romanticism in Spain*. A study of its origin and evolution from its earliest manifestations in the eighteenth century to Bécquer, with special attention to poetry and drama. 3 units.

†Not offered in 1970-71.

265. *Golden Age Literature: Cervantes*. The life and works of Cervantes with special emphasis on his *Quijote*. 3 units. *Predmore and Wardropper*

266. *Golden Age Literature: The Drama*. Study of the chief Spanish dramatists of the seventeenth century with readings of representative plays of this period. 3 units. *Wardropper*

275, 276. *Contemporary Spanish Literature*. First semester: the essay and lyric poetry. A study of the revision of national values and literary expression in the 20th century, with particular reference to the crisis of 1898 and to the enrichment of the Spanish tradition through extra-peninsular influences. Second semester: the novel. A study of tradition and innovation in the twentieth-century Spanish novel with emphasis on the novels of Unamuno, Baroja, Valle Inclán, and Pérez de Ayala. 6 units. *Predmore*

For Graduates

321, 322. *Hispanic Seminar*. Each semester one of the following topics will be selected for intensive treatment: (1) the Spanish language in America, (2) studies in Medieval literature, (3) studies in the literature of the Golden Age, (4) studies in Latin American literature, (5) studies in the Spanish Renaissance and Baroque, (6) studies in Spanish poetry, (7) studies in nineteenth-century Spanish literature, and (8) studies in twentieth-century literature. 3 units each semester. *Davis, Fein, Predmore, and Wardropper*

Romance Languages

211. *Approaches to Romance Literature*. An introduction to the most significant ways in which Romance literature has been divided and studied, with analyses of selected texts. 3 units.

218. *The Teaching of Romance Languages*. Evaluation of objectives and methods; a study of the practical problems involved in teaching these languages on the elementary, secondary, and college levels; analysis of textbooks, special foreign language programs, audiovisual aids; critical examination of modern techniques in written and oral testing. 3 units. *Dow*

Slavic Languages and Literatures

Associate Professor Krynski, *Chairman*; Associate Professor Jezierski

No graduate degree is presently offered in Slavic languages and literatures. The following courses may serve in the minor programs of students in other departments.

201, 202. *The Novelists of Nineteenth-Century Russia*. Development of the Russian novel against the European background, with emphasis on Dostoevsky and Tolstoy. Extensive readings in English. 6 units. *Krynski*

†207. *Soviet Literature and Culture*. Literature since 1917, as a continuation of nineteenth-century traditions and as a response to Soviet ideology. Readings (in English or Russian) from major works of prose, poetry and drama. 3 units. *Jezierski*

†212. *Pushkin*. A survey of his life and works, with attention given to his role as a precursor of modern Russian Literature. Readings in English or Russian. Prerequisite: Russian 101, or the instructor's consent. 3 units. *Krynski*

215, 216. *Advanced Composition and Syntax*. A detailed study of the morphological and syntactic structure of modern Russian. Compositions based on literary topics. A graduate course open to qualified undergraduate students. Prerequisites: Russian 91, 92 or instructor's permission. 6 units. *M. Pavlov*

†224. *The Russian Short Story—Eighteenth Century to the Present*. Readings of stories by such masters of the genre as Pushkin, Gogol, Turgenev, Tolstoy, Dostoevsky, and Chekhov. Readings in English. Majors will do part of the reading in Russian. 3 units. *Jezierski*

225. *Tolstoy*. A study of his life and works. The novels, short fiction, plays, and other writings considered in the light of his world significance. 3 units. *Jezierski*

†227. *Gogol*. Life and works: short stories, dramas and the novel. Readings in English, but students knowing Russian will do part of the reading in that language. 3 units. *Jezierski*

230. *Chekhov*. Chekhov as a short story writer and his influence on the twentieth-century Western short story. Close structural analysis of the plays of one of the greatest dramatists of all time. 3 units. *Krynski*

†232. *Fyodor Dostoevsky*. A close examination of the major fiction of a leading nineteenth-century Russian writer whose craft and ideas remain a living influence in much of contemporary Western literature. 3 units. *Jezierski*

233. *Ivan Turgenev*. The novels, short stories and drama of the great exponent of classical realism who was the first Russian writer to win fame in the West. 3 units. *Krynski*

Slavic 204. *Polish Literature of the Twentieth Century*. Readings in English of Polish novels, plays and poems, from the beginning of the century through the sixties. Emphasis on the avant-garde works of the liberal period after 1955. 3 units. *Krynski*

†Slavic 205. *The Structure of Polish in Relation to Russian*. Comparative and contrastive study of the two major Slavic languages. Consider-

†Not offered in 1970-71.

able emphasis placed on preparing students to read Polish literary texts. 3 units. *Krynski*

†Slavic 206. *Readings in Contemporary Polish Prose in the Original*. Stylistic analysis of aphoristic prose by Lec, philosophical allegories by Kolakowski, and short short-stories by Mrozek and Hlasko. 3 units. *Krynski*

†Slavic 236. *Russian and Polish Romanticism*. Prose, poetry, drama of such major writers as Pushkin, Lermontov, Mickiewicz, and Krasinski presented against the background of the Romantic movement in Western Europe. 3 units. *Krynski*

Sociology and Anthropology

Professor Tiryakian, *Chairman* (268 Sociology-Psychology Building); Professor Smith, *Director of Graduate Studies for Sociology* (332 Sociology-Psychology Building); Professors Back, Kerckhoff, La Barre, McKinney, Maddox, Myers, Preiss, and Roy; Associate Professor Fox, *Director of Graduate Studies for Anthropology* (341 Sociology-Psychology Building); Associate Professors Apte and Palmore; Assistant Professors Baylis, Bowers, Brehm, Crocker, Hartford, Murch, and Wilson

The department offers graduate work leading to the A.M. and Ph.D. degrees in sociology and in anthropology. Before undertaking advanced work in this department, a student must have completed a minimum of twelve semester hours of approved preliminary courses in his chosen discipline, and twelve additional semester hours in the field or in related work. Applicants for admission should submit scores on the Graduate Record Examination, especially the Aptitude Test.

Before being admitted to candidacy for the Ph.D. degree in sociology, an applicant is normally expected to have qualified for the A.M. degree without a thesis. Candidates for the Ph.D. degree are expected to demonstrate in qualifying and preliminary examinations a broad background in the various aspects of sociology—substantive, theoretical, and empirical. The program of each candidate is determined by a committee which reviews his previous work and sets the specific requirements to be met. These requirements will include work in related fields such as anthropology, economics, mathematics, philosophy, political science, or psychology. Emphasis is placed on the completion of the dissertation, directed by a member of the staff, demonstrating competence and independence in the investigation of an original and significant problem.

Before being admitted to candidacy for the Ph.D. degree in anthropology, an applicant is normally expected to have qualified for the A.M. degree. Candidates for the Ph.D. degree must show evidence by prelimi-

†Not offered in 1970-71.

nary or qualifying examination of a command of a major field within the discipline. The department recognizes the trend in modern anthropology toward interdisciplinary research and part of the anthropology course requirements may be replaced by advanced work in anatomy, economics, sociology, zoology, and other disciplines relevant to the student's program.

Further details of these programs, the departmental facilities, the staff, and various stipends available are described in a brochure which may be obtained from either the Director of Graduate Studies for Sociology or the Director of Graduate Studies for Anthropology, Department of Sociology and Anthropology.

Sociology

For Seniors and Graduates

241. *Social Stratification*. The nature of hierarchical and vertical differentiation in the economic, political, and prestige structures in modern societies. The interrelationship of class, status, and power strata and their influence on social institutions, personality structure, and group and individual behavior. 3 units. *Roy*

242. *The Sociology of Occupations and Professions*. The social significance of work. Analysis of forces changing the contemporary occupational structure, typical career patterns of professions and occupations, the social organization of occupational groups. 3 units. *McKinney and Roy*

243. *Population Dynamics and Social Change*. The aim of this course is to introduce the student to the facts and techniques of demographic analysis, and to provide an understanding of the relationship between the demographic structure of society and its social organization. 3 units. *Myers and Hartford*

†247. *Community and Society*. This course seeks to provide a frame of reference for the analysis and ordering of facts pertaining to the diverse cultures of the world, the State, the world community, the Great Society, news, mass behavior, social problems, races and classes. 3 units. *Staff*

251. *The Sociology of Modernization*. Changes, obstacles to change, and structural strains which occur in kinship, stratification, bureaucracy and the role of the military, occupations and work, communications, values and ideologies, during modernization. 3 units. *Murch and Tiryakian*

253. *Social Institutions*. The study of particular institutions and the social movements out of which they developed, with emphasis on the development of general propositions concerning the nature, function and importance of institutions in society. 3 units. *Staff*

†Not offered in 1970-71.

255. *Race and Culture*. A comparative study of race relations in world perspective developed around such themes as races and personal identity, the geography and ecology of race relations, the idea of race, and race conflict. 3 units. *Palmore*

259. *Religion and Social Change*. A study of the role of religion in significant social changes in Western and non-Western societies. Emphasis given to non-institutional phenomena (charisma, prophecy, messianism, revivals, glossolalia). Prerequisite: either Anthropology 264, Sociology 151, or the equivalent. 3 units. *Tiryakian and Wilson*

272. *The Socialization Process*. A consideration of the universal societal requirement for replacement of socialized personnel with major concentration on the process in Western society. Particular attention is given to variations in socialization by position in the social structure (class, caste, urban-rural) and to the contributions made by various socialization agencies (family, school, peer groups, mass media). 3 units. *Kerckhoff*

275. *Social Attitudes and Individual Behavior*. Such issues as the following are considered: the importance of symbolic interaction, the development of the "self," the social structuring of the socialization process, individual movement within the social structure, and the importance of membership groups and reference groups. 3 units. *Back and Kerckhoff*

278. *Social Structure and the Life Cycle*. A study of the relationship between age as a social characteristic and social interaction, with particular reference to adolescence and old age. 3 units. *Maddox*

282. *Principles of Sociological Analysis*. An advanced course in general sociology designed to give a systematic conception of social order, focusing on its structural components and the functions they serve. Prerequisites: undergraduates must have at least 15 s.h. and a *B* average in sociology and have the permission of the instructor. 3 units. *McKinney and Wilson*

295. *Methodology in Sociology*. Considerations of the nature of scientific method, as well as alternative paths to knowledge, as they apply to sociology. Conceptualization, hypothesis formation, and definition. The research process as a decision-making situation both on the general level of research design and the specific level of special techniques. The process and logic of data analysis. Relations of theory and research are stressed. 3 units. *Smith*

297. *Statistical Analysis in Sociology*. Such techniques as zero and higher order linear and curvilinear correlation, partial correlation, analysis of variance and covariance and factorial design are studied. Where possible, analogous non-parametric techniques are also considered. Prerequisite: Mathematics 133 or an equivalent course or permission of the instructor. 3 units. *Brehm and Hartford*

For Graduates

325. *Social Aspects of Mental Illness and Treatment*. An examination and critique of sociological research and theory in the epidemiology, etiology and treatment of mental illness. Such topics as the effect of mental illness on the family, the structure and function of various treatment systems, and major problems of methodology will receive emphasis. 3 units. *Back and Preiss*

341. *Special Problems of Complex Systems*.

a. Industrial and Professional Systems. Analysis of problems of organization of work in such diverse settings as industrial plants, hospitals, and public administration groups. Problems of decision-making, recruitment, allocation of authority, informal organization, interorganizational relations. 3 units. *McKinney, Pondy, and Roy*

b. Mass Communications. Theoretical problems in defining and distinguishing communication, communicative acts, communication processes, and communication systems. Work aimed toward the derivation of models and theories for each of these will be pursued. Students must have permission of the instructor. 3 units. *Smith*

c. Urban Society. Analysis is made of the varying mechanisms through which urban society is integrated, how urbanites develop a sense of identification with the community, and the extent and mode of social dominance of the city in the larger society. 3 units. *Smith*

d. Human Ecology. An examination of such issues as: the logic and utility of the ecological approach; the possibility of testing current ecological theories in non-western, non-urban environment; alternative explanations for the spatial patterning of social phenomena; selected methodological problems. 3 units. *Myers and Smith*

351, 352. *Seminar in Social Organization*. Examination of such problems as the bases of social cohesion and continuity, the sources and effectiveness of social control mechanisms, the problem of social change in structural-functional theory. 3 units each semester. *Maddox, McKinney, and Pondy*

361. *Seminar in Comparative Sociology*. Major emphasis on the relevance of evolutionary, functional, and structural theories for explaining the findings of comparative studies. 3 units. *Murch and Wilson*

373, 374. *Social Psychological Issues in Sociology*. Detailed exploration of selected problem areas such as the theory and measurement of social attitudes, role discontinuity and personality disorders, applications of reference group theory, the socialization process. 3 units each semester. *Back, Kerckhoff, and Preiss*

381. *Development of Sociological Theory*. An analysis of the development, convergence and utilization of sociological theory. 3 units. *Tiryakian and Wilson*

385, 386. *Seminar in Sociological Theory*. Detailed analysis of method-

ological and substantive problems in utilizing comprehensive, middle-range, and discrete theories in varied sociological areas. Major emphasis on the use of theory in empirical research. Prerequisite: Sociology 381 or equivalent. 3 units each semester. *McKinney and Tiryakian*

392. *Individual Research in Sociology*. Students will conduct on an individual basis research designed to evaluate a sociological hypothesis of their choice. The process must be completed by preparation of a report on this research in adequate professional style. Prerequisite: Sociology 295 or permission of the instructor. 3 units. *Back, Kerckhoff, and Smith*

397, 398. *Seminar in Special Research Problems*. Treatment in depth of either selected methodological issues and/or methods. Examples of possible topics include scaling, methods of machine data processing, validation and induction, theory construction, quantification, interviewing, measurement, sampling plans, development of research designs from statistical models, methodological research, experimental techniques, demographic techniques, the relation of theory to research, and the role of statistical methods in sociology. Prerequisite: permission of instructor. 3 units each semester. *Staff*

Anthropology

For Seniors and Graduates

220. *Society and Culture in India*. The basic features of Indian cultures and societies from an anthropological perspective. The impact of selected technological and social changes upon the individual, caste, and community. 3 units. *Fox*

222. *Topics in African Anthropology*. Current research problems in African anthropology, as illustrated by an intensive and continuing study of a tribal society. Interpretation of the results of field research in terms of contemporary theories about culture and society. 3 units.

231. *Physical Anthropology*. A survey of the major developments of physical anthropology. Human evolution, primate phylogeny, paleontology of man and other primates, primate biochemical genetics, primate behavior, human variation (genetic and somatic) are the principal topics of the course. (Also listed as Anatomy M231.) 3 units. *Buettner-Janusch*

232. *Human Genetics*. Particular emphasis upon the uniqueness of studies in human genetics, human biochemical genetics, human population genetics. (Also listed as Anatomy 232 and Zoology 232.) Prerequisites: Anatomy 231, Zoology 131 (or an elementary course in biology including genetics), or permission of instructor. 3 units. *Buettner-Janusch*

238. *Language and Society*. An introduction to the study of language and society. Universal features of language, languages as a mirror of society and social perception through language, language as a coding system, linguistics and anthropology, applied linguistics. 3 units. *Apte and Baylis*

240. *Indo-Aryan Linguistics*. Historical development of Indo-Aryan languages from Sanskrit to the modern period. A comparative analysis of modern Indo-Aryan languages as regards phonology, morphology, syntax and lexicon. Impact of non-Indo-Aryan languages on the structure and lexicon of Indo-Aryan languages. Prerequisite: Linguistics 101 or permission of instructor. 3 units. *Apte*

249. *Economic Anthropology*. The study of economic organization and behavior in preliterate, peasant and transitional societies. Problems in the analysis of ownership and distribution. The relationship of economic processes to norms and institutions such as markets. 3 units. *Crocker*

260. *Linguistic Anthropology: Phonemics*. Application of descriptive linguistics to analysis of language; concentration on the sound system of a South Asian language, and/or other non-Western languages. Prerequisite: permission of the instructor. 3 units. *Apte*

261. *Linguistic Anthropology: Morphology and Syntax*. Application of descriptive linguistics to analysis of language; concentration on the grammatical system of a South Asian language, and/or other non-Western languages. Prerequisite: Anthropology 260 or permission of the instructor. 3 units. *Apte*

262. *Anthropology of Law*. An introduction to the study of legal anthropology. Legal decision in preliterate societies. The interrelationships of law, ritual, and myth as viewed in recent studies of tribal societies. 3 units. *Crocker*

263. *Primitive Art and Music*. A comparative ethnological study of the data and theories concerning non-European music and art; sufficient technical background will be provided for non-specialist students. Recordings, slides, and museum artifacts will be used. 3 units. *La Barre*

264. *Primitive Religion*. The ethnography, the social functions, and the socio-psychological meanings of religion in primitive societies. 3 units. *La Barre and Crocker*

265. *Personality and Society*. The sociology and social psychology of human personality, its origins in the primary group, its nature and varieties and its integrations into secondary group institutions. 3 units. *La Barre*

266. *Personality and Culture*. The influence of culture patterns and social institutions upon character structure, socialization of the individual, and the dynamics of human personality. Comprehensive anthropological materials will be drawn upon. 3 units. *La Barre*

276. *Analysis of Kinship Systems*. A study of primitive relationship categories and the ways in which they are related to legal norms, ritual

and social groupings. Theoretical issues and contrasting approaches to the analysis of social classification terminologies. 3 units. *Crocker*

280, 281. *Seminar in Selected Topics*. This course will enable students to explore topics in methodology, theory, or area, on a 200-level. Permission of the instructor required. 3 units each semester. *Staff*

291, 292. *Anthropological Theory*. An introduction to theoretical, methodological and comparative issues in anthropology. Emphasis on critical reading and review of monographs in social, cultural and psychological anthropology. 3 units each semester. *Crocker*

For Graduates

330. *Seminar in Anthropology*. A seminar for advanced students who wish to pursue individual studies in social and cultural anthropology. Offered both semesters. 1 to 3 units each semester. *Staff*

393. *Individual Research in Anthropology*. A course for the student preparing the A.M. thesis or the Ph.D. dissertation. Supervision and guidance of intensive research on a problem approved by the enrollee's departmental advisory committee. 3 units. *Staff*

410. *Seminar in the Government, History, and Social Structure of India and Pakistan*. 3 units. *Fox and Associates*

Zoology

Professor Fluke, *Chairman* (227 Biological Sciences Building); Professor Gregg, *Director of Graduate Studies* (047 Biological Sciences Building); Professors Bailey, Bookhout, Buettner-Janusch, Costlow, Klopfer, Livingstone, Schmidt-Nielsen, and Wilbur; Adjunct Professor Stefansson; Associate Professors Gillham, Nicklas, Tucker, Wainwright, and Ward; Assistant Professors Doyle, Sutherland, and Vogel

The Department of Zoology manages a variety of programs tailored to individual needs of students seeking A.M. or Ph.D. degrees.

In general, a student entering the department will be equipped to pursue an advanced degree if he has completed an undergraduate major in biology along with some formal training in college-level chemistry, mathematics, physics, and foreign languages.

Nevertheless, in recognition and support of the modern trend toward interdisciplinary research, the department is prepared to accept promising students with less orthodox academic backgrounds and is ready to encourage any student wishing to undertake a program of study leading, in effect, to an interdisciplinary degree sponsored by the department.

Thus, all students are urged to search widely in the *Bulletin of Undergraduate Instruction* and the *Bulletin of the Graduate School* for informa-

tion about the intellectual resources of the University. Special attention, perhaps, should be given to announcements of the Departments of Anatomy, Biochemistry, Botany, Chemistry, Geology, History, Mathematics, Microbiology and Immunology, Philosophy, Physics, Physiology and Pharmacology, Psychology, Sociology and Anthropology, and Zoology; announcements of the Schools of Engineering and Forestry should also be consulted.

For Seniors and Graduates

201. *Animal Behavior*. A review of the major developments in the field with emphasis on recent physiological and developmental studies. Prerequisites: physiology, genetics, and evolution, or consent of instructor. 3 units; 4 units with laboratory. *Klopper*

203. *Marine Ecology*. Ecological processes as exemplified by marine organisms. Lectures will cover environmental factors, intra- and inter-specific relationships, and community ecology. Class discussions on selected papers. Field projects utilizing current ecological methods. Practice in scientific writing. Use of computers in ecology. Prerequisites: a course in general zoology, invertebrate zoology, or an appropriate equivalent, and a year of mathematics; some knowledge of statistics will be helpful. (*Given at Beaufort.*) 6 units. *Sutherland*

205. *Elements of Theoretical Biology*. An introduction to elementary mathematical biology, conceived as the study of axiomatized mathematical theories and their biological models. Prerequisites: one year each of college biology and mathematics, or consent of instructor. 3 units. *Gregg*

213. *Ecological Oceanography*. Population ecology and energy relationships of life in the open ocean. Lectures, seminars, and some sea-time. Prerequisites: courses in ecology or invertebrate zoology, chemistry, and calculus; differential equations strongly recommended. 3 units. *Doyle*

214. *Biological Oceanography*. Composition in time and space of the marine biosphere in relation to descriptive marine chemistry, physics, and geology. Some work at sea aboard the research vessel. Prerequisites: a course in invertebrate zoology, ecology, marine biology, or an appropriate equivalent; chemistry through organic; and one year of physics and mathematics. (*Given at Beaufort.*) 6 units. *Staff*

216. *Limnology*. The chemistry, physics, and biology of lakes. 3 units; 4 units with laboratory. *Livingstone*

224. *Vertebrate Zoology*. A study of life histories, adaptations, ecology, and classification of vertebrate animals. Prerequisite: Zoology 53. 4 units. *Bailey*

228. *Experimental Embryology*. Lectures, readings, reports, and laboratory work. 4 units. *Gregg*

232. *Human Genetics*. Particular emphasis upon the uniqueness of studies in human genetics, human biochemical genetics, human population genetics. (Listed also as Anatomy 232.) Prerequisite: Anatomy 231 (Zoology 131) or an elementary course in biology including genetics, or permission of the instructor. 3 units. *Buettner-Janusch*

238. *Systematic Zoology*. The fundamental theory and practice involved in the collection, identification, and classification of animals. Prerequisite: Biology 1-2. 4 units. *Bailey*

240. *Chemical Oceanography*. Physicochemical properties of seawater, major and minor constituents, trace elements, dissolved gases, the carbon dioxide system, dissolved organic constituents, the nutrient systems and their biochemical and physicochemical aspects, dynamic equilibria in the chemical systems in the oceans. Laboratory work and field trips to collect data. Prerequisites: one year of physics, mathematics through calculus, a year of analytical chemistry or physical chemistry; an introductory course in general oceanography or a course in physical oceanography or permission of the instructor. (Listed also as Chemistry 240.) (Given at Beaufort.) 6 units. *Stefansson*

242. *Cytological Materials and Methods*. General cytological analysis with emphasis on chromosome studies using current optical, cytochemical, and other experimental techniques. Prerequisite: Zoology 243 or equivalent, and permission of instructor. 2 units. *Nicklas*

243. *Cytology*. The structural and functional organization of cells. Lectures, readings, and conferences. Prerequisite: one year of biology. (Listed also as Botany 243.) 3 units. *Anderson (Botany) and Nicklas*

244. *Topics in Cell Structure and Function*. Advanced discussions of selected problems such as chromosome structure, mitosis, and cytological aspects of inheritance and development. (Alternates with Zoology 288.) Prerequisite: Zoology 243 (Botany 243) or equivalent and permission of instructor. (Listed also as Anatomy 244.) 2 units. *Moses (Anatomy) and Nicklas*

245. *Radiation Biology*. Actions of ionizing and excitational radiations on life processes: a survey and an adventure in biophysics. Prerequisites: college physics and mathematics, organic chemistry. 3 units, or 4 units with laboratory. *Fluke*

246. *Physical Biology*. Physical principles of structure and function in large biological molecules and aggregates, applications to function at higher levels of organization, and to biological fitness. Prerequisites: Mathematics 22, Chemistry 151, Physics 41, and one and one-half years of college biology or consent of the instructors. 3 units. *Fluke and Wainwright*

247. *Biological Nucleonics*. Fundamentals of nucleonics; instruction in biological uses of radioactive tracers, in counting instruments and measurements, and in legal requirements. Prerequisites: consent of the in-

structor and one year each of college biology, chemistry, and physics. (Listed also as Forestry 247.) 3 units. *Fluke*

248. *Introductory Biochemistry*. The chemistry of proteins, lipids, carbohydrates, and nucleic acids and the metabolic interrelationships of these compounds. The biochemical basis of photosynthesis, genetics, vision, nutrition, nerve conduction, and muscle contraction will also be considered. Prerequisites: Chemistry 151, one year of college physics (second semester may be concurrent), Mathematics 22, or consent of the instructors. 3 units. *Wakil (Biochemistry) and Kirshner (Biochemistry)*

250. *Physiological Ecology of Marine Animals*. A study of the physiological responses of marine animals in relation to certain environmental factors and evolution. Animals representing numerous phyla from various habitats are studied. Prerequisite: a course in physiology. (*Given at Beaufort.*) 6 units. *Staff*

252. *Comparative Physiology*. The physiological mechanisms of animals studied on a comparative basis. Prerequisite: Zoology 151 or equivalent. 4 units. *Schmidt-Nielsen*

271. *Cell Physiology*. Studies of the physiological activities and mechanisms of cells and their components. Recent advances in cell biology. 4 units. *Wilbur*

274. *Marine Invertebrate Zoology*. A study of structure, functions, and habits of invertebrate animals under normal and experimental conditions. Field trips will be made to study, collect, and classify animals in their natural habitats. Prerequisite: Biology 1-2. (*Given at Beaufort.*) 6 units. *Staff*

278. *Invertebrate Embryology*. Lectures, readings, and laboratory work dealing with rearing, development, and life history of invertebrates. Prerequisite: Zoology 92. 4 units. *Bookhout*

280. *Principles of Genetics*. An introduction to the structure and properties of genes and chromosomes and to the evolution of genetic systems. Prerequisites: introductory courses in biology, chemistry and mathematics. (Also listed as Botany 180, Botany 280, and Zoology 180.) 3 units. *Boynton, Gillham, and others of the University Program in Genetics.*

288. *The Cell in Development and Heredity*. A seminar on topics of current interest and controversy. (Alternates with Zoology 244.) Prerequisites: A course in genetics and permission of one instructor. 2 units. *Counce (Anatomy), Gillham, and Staff*

For Graduates

351, 352. *Departmental Seminar*. A weekly meeting of graduate students and faculty to hear and discuss research reports. 1 unit credit by arrangement. *Staff and Invited Lecturers*

353, 354. *Research*. Students who have had proper training may carry on research under direction of members of the staff in the following

fields: (1) embryology, (2) physiology, (3) cytology, histology, (4) invertebrate zoology, (5) ecology, (6) morphology, (7) parasitology, (8) vertebrate zoology, (9) limnology, (10) entomology, (11) genetics, (12) biophysics, (13) animal behavior, (14) systematics, (15) oceanography. Others on demand. Hours and credits to be arranged. Staff

355, 356. *Seminar*. One or more seminar courses in particular fields are given each semester by various members of the staff. These will be in the fields indicated under courses 353-354 above. 2 units.

385. *Current Topics in Population Genetics and Evolution*. A seminar and lecture course devoted to the analysis of the current literature in population genetics and evolution. Given in response to adequate demand. Prerequisites: Zoology 280 or its equivalent and consent of the instructor. 1 unit. *Ward and others of the University Program in Genetics*

Genetics, The University Program in. Genetics courses offered by the Department of Zoology are part of The University Program in Genetics; see announcement in this *Bulletin*.

Marine Laboratory. The following courses will be given at the Duke University Marine Laboratory, Beaufort, N.C., during the summer of 1970: 203, *Marine Ecology*; 214, *Biological Oceanography*; 240, *Chemical Oceanography*; 250, *Physiological Ecology of Marine Animals*; 274, *Marine Invertebrate Zoology*. Also: Botany 211, *Marine Phycology*; Botany 220, *Coastal Field Botany*; Geology 205, *Geological Oceanography*; Geology 204, *Physical Oceanography*. Students with the proper training may register for 353, 354, *Research*.

Advanced Degrees Conferred June 2, 1969

Master of Arts

Abernethy, Kenneth Clyde
Arroyo, Edward B., Jr.
Babad, Elisha Yitzhak
Bell, Albert Atwood, Jr.
Berlin, Barry Peter
Bird, Keith William, Jr.
Box, Elgene Owen
Brau, Edward H.
Breytspraak, Linda Marshall
Brown, Millard Ray
Brown, Patsy Ann
Brunner, Larry George
Buonano, Donna Jeanne
Burger, Thomas
Calkins, Richard Allyn
Carter, Robin Michael
Castaldo, Ronald Roy
Cheves, Elizabeth Anne
Chow, Agnes Hsiu-Ming
Clements, Barbara Evans
Cochran, Clarke Edward
Cohen, Ralph Alan
Cole, Frances Ann
Colford, Elizabeth Esperanca
Collins, Daniel Francis
Comer, Suzanne Marie
Conde, Louis F.
Conway, Eugenia Cecelia
Cook, Gordon Southworth, Jr.
Crapa, Joseph Robert
Crockett, Martha Ann
Czech, Michael Paul
Davis, C. Ed
Dice, Jack Woodward
Dix, Elizabeth C.
Dyer, Morgan Coit
Field, Ann Barton

Fitzsimmons, William Thomas
Grote, Marie
Hahn, Jeffrey William
Hall, Bowman Newton, II
Hardy, Douglas Lee
Henrich, Joseph George
Hoffman, Charles Edward
Hoyt, Jeffrey Wood
Hyde, Connie Bazemore
Jones, Robyn A.
Jorgeson, Eric Charles
Kier, Jerry Stephen
Knapp, Richard Frederic
Kolins, Leonard William
Landau, Susan
Lawrence, Michael Bowie
Lilienthal, Cheryl Childs
Locke, John Rae, Jr.
Lynton, Rolf Peter
Maddox, Donald L.
Mangan, Mona Marian
Margerison, Kenneth Hilton, Jr.
Martin, Stephen Robert
Maskall, Martha Josephine
McCarter, Linda Hardy
Means, Herman Spencer, Jr.
Menefee, Andrea Cowles
Miao, Greta Gustafson
Mikat, Eileen M.
Morrow, Lance Franz
Mosley, Hugh G.
Mulligan, Winifred Joy
Murray, Sandra Rodgers
Ness, Gary Clifford
Niemann, Thomas Charles
Nordquest, David Arthur
Oglesby, Katherine Marie

Pfau, Judith Clare
 Porter, Ronald Dean
 Reasor, Mark Jae
 Reid, Robert Franklin, Jr.
 Richowsky, John Christopher
 Ridenour, Norman Holley
 Rives, Janet McMillan
 Robinson, David Edgar
 Rosenwald, Johanna Louise
 Rundel, Lynne Cryster
 Schmidtke, James Alan
 Short, Douglas Dean
 Solomon, Harry M., Jr.
 Spalt, Allen Evan
 Spivey, Lydia Luella
 Stephens, Hugh Llewellyn
 Stillman, David George
 Stillwell, Donna Ethel

Sweets, John Frank
 Temple, Virginia Ellen
 Thompson, Curtis G.
 Thomson, Thomas John
 Thorsen, Arthur Lawrence, III
 Tomek, James Joseph
 Vaughn, Garrett Alan
 Vaughn, Karen Iverson
 Wall, John Nelson
 Wallace, David Patrick
 Weaver, Richard Edwin, Jr.
 Webb, Geoffrey Roderick
 Wertz, Lana Henrichs
 Whipple, John Emery
 Wilcox, Fulton Robert
 Williams, Gary Lee
 Wolfskill, Ethel
 Zaverl, Robin Linda

Master of Arts in Teaching

Canady, Paul Glenn
 Emerson, Madelyn
 Ferguson, Samuel
 Frank, Richard
 Harris, Helen Hentz
 Lynema, Karen Joyce

Manning, Jean Carol
 Miller, Joseph T.
 Murdock, Valerie Sue
 Varnell, Sharon Harley
 Wesche, Sylvia Wall
 Wofford, Florence Jennings

Master of Education

Day, Shirley Warner
 Fleshman, Russell Curtis
 Fox, Mary Barbara
 Grigsby, Ruth Edge
 Hocutt, Maxine Lee
 Jones, Marian Sims
 Masters, Ellen Kahn
 McDonough, Mary Ann
 Mitchell, Miriam Grace

Munson, Sally Eliza
 Remigailo, Alice Deemer
 Sagro, Carol Elaine
 Scarborough, Martha Jane
 Schumacher, Dawn Arlene
 Stasavich, Mary Helen
 Tate, Flicka Louise
 Yohan, Elizabeth Hudson

Master of Science

Ali, Mohammed Sadiq
 Bhatnagar, Rajendra Swaroop
 Cudlin, Joseph John
 Galante, Vito Nicholas
 Gallop, Marshall Aubrey, Jr.
 Gosciniak, Terence John

Holloway, David Michael
 Lau, Henry
 Lim, Alexander Te
 Rechten, Gerd
 Shiau, Archie Cheng-chi

Master of Hospital Administration

Blair, William Dean
 Boston, Edward Dale
 Bovender, Jack Oliver, Jr.
 Brown, William Charles

Cook, Jack McPherson
 Davis, Norman McBrayer, Jr.
 Glover, William Fred
 Gulinson, Sheldon Keith

Head, William Christopher
Lippman, Darryl Rock
Quilty, Arthur Edward
Ross, Lawrence Endecott
Sherlock, Gary Vincent

St. John, Alcide W.
Stubbs, Stanley Lyon
Van Gieson, William Randolph
Warden, Henry Fairbanks, III

Doctor of Education

- Allen, Jesse Lee (B.S., North Carolina Central University; M.Ed., Duke University). *Education*. Dissertation: "The Effects Of School Desegregation On The Employment Status Of Negro Principals In North Carolina"
- Craddock, Richard Scott (A.B., University of North Carolina at Chapel Hill; M.Ed., Duke University). *Education*. Dissertation: "The Views Of Professional American Historians On The Values And Purposes Of Historical Study"
- Freitag, William Peter (B.A., Northern Illinois University; M.A., Roosevelt University). *Education*. Dissertation: "*De Facto* Segregation In The Public Schools Of The United States: The Neighborhood School Vs. Social Integration"
- McMahan, Elizabeth Lovell (B.S., Nebraska State Teachers College at Kearney; M.S.P.H., University of North Carolina at Chapel Hill). *Education*. Dissertation: "A Study Of The Department Of Public Health Education, School of Public Health, University of North Carolina"
- Myrick, Alvin Grant (B.S., North Carolina State University; M.A.T., University of North Carolina at Chapel Hill). *Education*. Dissertation: "Some Effects Of Space Science Materials Upon Student Achievement In Mathematics"
- Pell, Sarah-Warner Jenkins (A.B., M.A., Duke University). *Education*. Dissertation: "Administrative And Legal Aspects Of Dual Enrollment (Shared-Time) Programs"
- Smathers, Keener McNeal (A.B., Wofford College; M.A.T., Duke University). *Education*. Dissertation: "A History Of The Supervision Of Instruction In Schools For Negroes In North Carolina"
- Stallings, Ann Coble (A.B., M.Ed., Duke University). *Education*. Dissertation: "Legal Factors Pertaining To School Board Membership In Municipalities Over 100,000 Population"
- Ward, Charles Floyd (B.S., M.Ed., North Carolina State University). *Education*. Dissertation: "An Analysis Of Selected Legal And Operational Differences Among Public Two-Year College Systems"
- Watson, Larry Wayne (B.S., North Carolina State University; M.M., The University of Tennessee). *Education*. Dissertation: "The Relationship Of The Mathematical Course Work Of Teachers And The SAT-M Scores Of Their Students"
- Williams, William Watts (B.S., Wilson Teachers College; M.Ed., University of Maryland). *Education*. Dissertation: "An Experimental Investigation Of Individualized Instruction In The Teaching Of Quantitative Physical Science"
- Wilson, Ruby Leila (B.S.N., University of Pittsburgh; M.S.N., Case-Western Reserve University). *Education*. Dissertation: "Climate And Process For Change Within A Liberal Arts College"

Doctor of Philosophy

- Amstutz, Larry Ihrig (B.A., The College of Wooster). *Physics*. Dissertation: "Nuclear Magnetic Resonance Studies In Solid Hydrogen"
- Applewhite, James William, Jr. (B.A., M.A., Duke University). *English*. Dissertation: "Wordsworth's Imaginative Use Of Place"
- Arpad, Joseph John (B.A., University of California at Los Angeles; M.A., University of Iowa). *English*. Dissertation: "David Crockett, An Original: Legendary Eccentricity And Early American Character"

- Ballard, Lewis Franklin (B.S., North Carolina State University; M.S., Duke University). *Electrical Engineering*. Dissertation: "Long Term Radiation Induced Conductivity In Polyethylene Terephthalate"
- Barket, Thomas Preston (B.A., Rockhurst College). *Chemistry*. Dissertation: "The Synthesis And Isomerism Of Some Phospholene Derivatives"
- Bastedo, Thomas Galbraith (B.A., M.A., University of Toronto). *Political Science*. Dissertation: "The Judiciary In Bihar: An Administrative Study"
- Bedell, George Chester (B.A., University of the South; B.D., Virginia Theological Seminary; M.A., University of North Carolina at Chapel Hill). *Religion*. Dissertation: "Kierkegaard And Faulkner: Modalities Of Existence"
- Bickley, Robert Bruce, Jr. (B.A., University of Virginia; M.A., Duke University). *English*. Dissertation: "Literary Influences And Technique In Melville's Fiction: 1835-1856"
- Boyarsky, Rose Eisman (B.S., University of Vermont; M.A., Columbia University). *Psychology*. Dissertation: "Deficits In Memory For Paired Associates In Older Persons"
- Brian, Beverly Dianne (B.A., Baylor University; M.A., Duke University). *English*. Dissertation: "Satire In *Piers Plowman*"
- Brown, Ann Pauline Nicolette Friederich (B.A., M.A., University of North Carolina at Chapel Hill). *History*. Dissertation: "Ultra-Royalist Deputies In The *Chambre Introuvable*, 1815-1816"
- Butler, Keith Winston (B.S., Ontario Agricultural College). *Physiology*. Dissertation: "Magnesium And Sheep Red Cells. Magnesium Content, Binding, And Role Of Magnesium In S And I-ATPases"
- Cannon, Dale Wayne (B.A., Seattle Pacific College). *Religion*. Dissertation: "Mastered Irony: The Point Of Entry Into A Post-Critical Epistemology"
- Carone, Patrick Angelo (A.B., M.A., West Virginia University). *Political Science*. Dissertation: "The Governor As A Legislator In West Virginia"
- Cashman, Richard Ian (B.A., Sydney University; M.A., Monash University). *History*. Dissertation: "The Politics Of Mass Recruitment. Attempts To Organize Popular Movements In Maharashtra, 1891-1908"
- Cavanagh, John Carroll (B.A., Dartmouth College; M.A., Columbia University). *History*. Dissertation: "The Military Career Of Major General Benjamin Lincoln In The War Of The American Revolution, 1775-1781"
- Clapp, William Lee (B.S., Wake Forest University; M.A., Duke University). *Chemistry*. Dissertation: "Solvent Distribution With Ion Exchange Resins In Some Selected Alcohol Water Mixtures"
- Clarke, Jeffrey Johnstone (A.B., Gettysburg College; M.A., Duke University). *History*. Dissertation: "Military Technology In Republican France: The Evolution Of The French Armored Force, 1917-1940"
- Clarke, Stanley Gordon (B.A., University of Saskatchewan). *Philosophy*. Dissertation: "Emotion"
- Connett, Richard James (B.A., Park College). *Biochemistry*. Dissertation: "S-Adenosylmethionine: Phenylethanolamine-N-Methyltransferase. Purification And Properties"
- Cook, Larry Wayne (B.A., M.A., Texas Technological College). *English*. Dissertation: "Narrators In The Works Of Nathaniel Hawthorne"
- Corredor, Carlos Francisco (B.S., Tennessee Wesleyan College; M.S., University of Missouri). *Biochemistry*. Dissertation: "The Role Of Carnitine In Certain Disease States"
- Crofts, Richard Arthur (B.A., Georgetown College). *Religion*. Dissertation: "Ecclesiastical Reform Proposals In Germany From 1510-1520"
- Crosby, Marshall Robert (B.S., Duke University). *Botany*. Dissertation: "A Revision Of The Tropical American Moss Genus *Pilotrichum*"
- Cunningham, John Monroe (B.A., Southern Methodist University; M.A., Duke University). *English*. Dissertation: "Byron's Poetics in *Don Juan*"

- Dale, Stephen Wayne (B.S., Emory University; M.A., Duke University). *Chemistry*. Dissertation: "A Study Of The Nuclear Magnetic Spin-Lattice Relaxation Of Phosphorus-31"
- Davis, Thomas Richard (B.A., Dartmouth College; B.D., Union Theological Seminary). *Religion*. Dissertation: "Integrity And Compromise In The Public Thought And Policy Positions Of Adlai Stevenson"
- Dennis, John Goodwin (B.A., Dartmouth College). *Botany*. Dissertation: "Growth Of Tundra Vegetation In Relation To Arctic Microenvironments At Barrow, Alaska"
- Dunn, Patrick Peter (A.B., Marquette University; M.A., Duke University). *History*. Dissertation: "V. G. Belinskii: The Road To Reality, 1811-1841"
- Farrier, David Saks (B.S., Virginia Polytechnic Institute). *Chemistry*. Dissertation: "Stereochemical And Biosynthetic Studies In The Mesembrine Alkaloids"
- Fellows, Robert Ellis, Jr. (A.B., Hamilton College; M.D., McGill University). *Biochemistry*. Dissertation: "Studies On The Amino Acid Sequence Of Rabbit Immunoglobulin G"
- Fleming, Diane Oakerson (B.S., College Of William and Mary; M.S., Emory University). *Microbiology*. Dissertation: "In Vitro Experimental Effects Of Radiocobalt 60 On Rabbit Polymorphonuclear Leucocytes"
- Foy, Martha Randolph (A.B., Randolph-Macon Woman's College; M.A., Yale University). *Romance Languages*. Dissertation: "From Reality To Imagination In The Works Of Saint-Amant"
- Frankfater, Allen (B.S., Brooklyn College). *Biochemistry*. Dissertation: "Studies Of L-Histidine Ammonia Lyase"
- Gagan, David Paul (B.A., M.A., University of Western Ontario). *History*. Dissertation: "The Queen's Champion: The Life Of George Taylor Denison, III, Soldier, Author, Magistrate And Canadian Tory Patriot"
- Gravely, William Bernard (B.A., Wofford College; B.D., Drew University). *Religion*. Dissertation: "Gilbert Haven, Racial Equalitarian. A Study Of His Career In Racial Reform, 1850-1880"
- Griess, Thomas Everett (B.S., United States Military Academy; M.S., University of Illinois). *History*. Dissertation: "Dennis Hart Mahan: West Point Professor And Advocate Of Military Professionalism, 1830-1871"
- Hansen, John Frederick (B.A., Wisconsin State University; M.A., Duke University). *Chemistry*. Dissertation: "Part I: Proton Magnetic Resonance And Mass Spectral Studies Of The (2) Benzopyrano (3,4-g) Indole Alkaloids Of The Amaryllidaceae. Part II: Photochemical Synthesis And Spectral Examination Of Some Bridged-Biphenyls"
- Harris, Victor Alan (B.A., Brown University). *Psychology*. Dissertation: "The Effects Of Power Variations On Public Agreement And Private Attitude Change"
- Hay, Ronald Leroy (B.S., Southern Illinois University; M.F., Duke University). *Forestry*. Dissertation: "Effects Of Planting Deformation On Growth Of Loblolly Pine Seedlings"
- Henoch, Frederick Evan (B.S., Indiana University). *Chemistry*. Dissertation: "Condensations Of Mono- And Dianions Of Hydrazones And Related Compounds"
- Hilmon, Junior Bristo (B.S., Virginia Polytechnic Institute; M.S., Utah State University). *Botany*. Dissertation: "Autecology Of Saw Palmetto (*Serenoa Repens* (Bartr.) Small)"
- Hilty, Hiram Horace (B.A., Bluffton College; B.D., Hartford Theological Seminary). *History*. Dissertation: "North Carolina Quakers And Slavery"
- Hood, Thomas Charles (B.A., Michigan State University; M.A., Duke University). *Sociology*. Dissertation: "Leadership Nominations: A Study Of The Determinants Of Consensus"
- Jones, John Paul (B.S., University of South Dakota; A.M., University of Notre Dame). *Political Science*. Dissertation: "A Comparative Analysis Of Theories

- Of Religion And Politics As Applied To Relevant Decisions Of The United States Supreme Court"
- Jones, Russell Allen (B.S., Georgia Institute of Technology). *Psychology*. Dissertation: "Choice, Degree Of Dependence, And The Possibility Of Future Dependence As Determinants Of Helping Behavior"
- Kashmiri, Syed Virasat Shikoh (B.S., Lucknow Christian College; M.S., Lucknow University). *Microbiology*. Dissertation: "A Study Of The Genetic Elements Involved In The Regulation Of Synthesis Of The Leucine Biosynthetic Enzymes of *Neurospora*"
- Kerton, Robert Richard (B.S., University of Toronto; M.A., Carleton University). *Economics*. Dissertation: "Labor Theory And Developing Countries: The Individual's Supply Of Effort In The Caribbean"
- Kim, Hyun Dju (A.B., Duke University). *Physiology*. Dissertation: "Studies On The Energy Metabolism Of Pig Red Cells"
- King, Edward Bleakley (B.A., University of the South; B.D., Seabury Western Theological Seminary; M.A., Florida State University). *History*. Dissertation: "Robert Grosseteste And The Pastoral Office"
- Kirby-Smith, Virginia (B.A., Goucher College; M.A., Duke University). *English*. Dissertation: "The Development Of Australian Theatre And Drama: 1788-1964"
- Lichter, James Joseph (B.S., Loras College; M.S., Fordham University). *Physics*. Dissertation: "Electron Spin Resonance Studies Of Radiation Damage To A Single Crystal Of Deoxyadenosine Monohydrate"
- Lucas, David Owen (B.A., Duke University). *Microbiology*. Dissertation: "An Immunological Investigation Of Specific Antigens Of The Cornea And Other Ocular Tissues"
- Lucke, James Bennett (B.A., Whitman College). *Mathematics*. Dissertation: "Commutativity In Locally Compact Rings"
- Marcello, Ronald Ely (B.S., Millersville State College). *History*. Dissertation: "The North Carolina Works Progress Administration And The Politics Of Relief"
- Massanari, Ronald Lee (B.A., Goshen College; M.A., University of Wisconsin; B.D., Garrett Theological Seminary). *Religion*. Dissertation: "Christianity And The Social Problem: Adolf Stoecker's 'Christian-Socialist' Alternative To Marxist Socialism In Nineteenth Century Germany"
- Matthews, Edwin John (B.S., Rensselaer Polytechnic Institute). *Microbiology*. Dissertation: "In Vitro Response Of Chick Embryo Cells Infected With MC 29 Avian Leukosis Virus To Inhibitors Of DNA, RNA And Protein Synthesis"
- McKnight, James Samuel (B.S., M.S., Duke University). *Physics*. Dissertation: "The Submillimeter Microwave Spectrum Of Oxygen"
- Middleton, Charles Ronald (B.A., Florida State University; M.A., Duke University). *History*. Dissertation: "The Administration Of British Foreign Policy 1782-1846"
- Moretz, Rufus Ledford (B.A., Lenoir Rhyne College; B.D., Lutheran Theological Southern Seminary). *Religion*. Dissertation: "The Textual Affinity Of The Earliest Coptic Manuscripts Of The Gospel Of John"
- Nelsen, Roger Bain (B.A., DePauw University). *Mathematics*. Dissertation: "Appointment Streams With Unpunctual Customers"
- Nute, Peter Eric (B.S., Yale University). *Anatomy*. Dissertation: "Genetic And Evolutionary Studies Of Hemoglobins And Transferrins In The Primates"
- Oelfke, William Clarence (B.S., Stanford University). *Physics*. Dissertation: "Millimeter Wave Spectrum Of Hydrogen Peroxide"
- Parrent, Allan Mitchell (B.A., Georgetown College; B.D., M.A., Vanderbilt University). *Religion*. Dissertation: "The Responsible Use Of Power: The Cuban Missile Crisis In Christian Perspective"
- Parsons, John Thomas (B.A., DePauw University). *Biochemistry*. Dissertation: "A Study Of Nuclear And Cytoplasmic Ribonucleoprotein Particles In Rat Liver"
- Parsons, Sarah Jox (B.A., Valparaiso University). *Microbiology*. Dissertation: "The

Purification And Properties of β -Isopropylmalate Dehydrogenase From *Salmonella Typhimurium* And A Study Of Polarity Effects And Polypeptide Chain Termination"

- Penn, William Melvin, Jr. (B.A., Western Maryland College). *Economics*. Dissertation: "Differences Between The 'Perceived Costs' and 'Resource Costs' Of Urban Passenger Transportation And Their Effects Upon The Choice Of Travel—With Special Application To The Baltimore Area"
- Plehwe, Rudolf (B.A., LL.B., University of Tasmania; M.A., Duke University). *Political Science*. Dissertation: "Administrative Responsibility And Autonomous Commissions: A Study Of Selected Regulatory Commissions In Ontario And Quebec"
- Racine, Charles Henry (B.A., Dartmouth College; M.A., Duke University). *Botany*. Dissertation: "Tree Reproduction In Relation To Vegetational And Environmental Gradients On Slopes In The Southern Blue Ridge"
- Rahman, Abu Tayeb Rafigur (B.A., M.A., Dacca University; M.A., Karachi University). *Political Science*. Dissertation: "The Concept Of Political Development Origins And Current Manifestations"
- Redmond, Audrey Fisher (B.A., Wellesley College). *Physiology*. Dissertation: "A Study Of The Relationship Between The Effect Of ACTH On Adrenal Cholesterol Ester Depletion And Its Action On Seroidogenesis"
- Reinhardt, William Warren (B.A., M.A., Duke University). *History*. Dissertation: "The Legislative Council Of The Punjab 1897-1912"
- Richards, George David (B.A., Hamilton College; M.A., Duke University). *English*. Dissertation: "Shelley's *Queen Mab*: A Critical Edition"
- Richards, Michael Dulany (B.A., Tulsa University; M.A., Duke University). *History*. Dissertation: "Reform Or Revolution: Rosa Luxemburg And The Marxist Movement, 1893-1919"
- Roe, Myong-Joon (LL.B., Seoul National University; M.C.L., Duke University). *Political Science*. Dissertation: "Public International Law And Fisheries Interests Of Selected Commonwealth States, 1936-1960"
- Romine, Benjamin Houston, Jr. (B.A., Florida State University; M.A., Duke University). *Education*. Dissertation: "The Effects Of The Interaction Between A Personality Characteristic And An Environmental Characteristic On The Achievement Of Female College Freshman When Ability Is Controlled"
- Rosenwald, John Robert (B.A., M.A., University of Illinois). *English*. Dissertation: "A Theory Of Prosody And Rhythm"
- Rowlands, Graddon Richard (B.A., M.A., Cambridge University). *Political Science*. Dissertation: "Political Development And The British Foreign Aid Program"
- Rundel, Philip Wilson (B.A., Pomona College; M.A., Duke University). *Botany*. Dissertation: "The Distribution And Ecology Of The Giant Sequoia Ecosystem In The Sierra Nevada, California"
- Sarkissian, Berge (B.S., Drexel). *Physics*. Dissertation: "Theory Of Quantum Crystals"
- Scagnelli, Paul (B.S., University of North Carolina). *Psychology*. Dissertation: "Relationships Among Visual Imagery, Language And Haptics In Spatial Perception"
- Sellin, David Lee (B.S., California Institute of Technology). *Physics*. Dissertation: "Excited States in ^{19}F "
- Sharpe, John Lawrence, III (B.A., Wofford College; B.D., Duke University). *Religion*. Dissertation: "Prolegomena To The Establishment Of The Critical Text Of The Greek Apocalypse Of Moses"
- Shaver, Kelly Gray (B.S., M.S., University of Washington). *Psychology*. Dissertation: "The Effects Of Relevance And Severity On The Attribution Of Responsibility For Accidents"
- Sherwood, David William (B.A., Wittenberg University). *Psychology*. Dissertation:

- "The Differential Effects Of Assessment Context And Scoring Method On Creativity Performance In Children"
- Spivey, Herbert Edward (B.A., Davidson College; M.A., Duke University). *English*. Dissertation: "Carlyle And Mill On The Individual In Society"
- Stein, Allen Frederick (B.A., M.A., New York University). *English*. Dissertation: "The Presentation And Criticism Of The American Scene In The Works Of Cornelius Mathews"
- Stires, Lloyd Kenneth (B.A., Drew University). *Psychology*. Dissertation: "Leadership Designation And Perceived Ability As Determinants Of The Tactical Use Of Modesty And Self-Enhancement"
- Thomason, Michael Vincent Raphael (B.A., University of the South; M.A., Duke University). *History*. Dissertation: "The Colonial Government And Economic Development In Kenya, 1900-1921"
- Thompson, James Russell, Jr. (B.S., Davidson College). *Physics*. Dissertation: "A High Resolution Study Of The Susceptibility Of Liquid He³"
- Walser, Joseph Gaither, III (B.A., University of North Carolina; B.D., Union Theological Seminary). *Religion*. Dissertation: "A Study Of Selected Economic Factors And Their Contribution To The Understanding Of The History Of Palestine During The Hellenistic Period"
- Watson, Charles Nelles, Jr. (B.A., Princeton University; M.A., Duke University). *English*. Dissertation: "Characters And Characterization In The Works Of Herman Melville"
- Weigl, Peter Douglas (B.A., Williams College). *Zoology*. Dissertation: "The Distribution Of The Flying Squirrels, *Glaucomys Volans* And *G. Sabrinus*: An Evaluation Of The Competitive Exclusion Idea"
- Weinberg, Daniel I. (B.E.E., Clarkson College of Technology; M.S., Duke University). *Physiology*. Dissertation: "Electrical Excitation Of The Canine Heart"
- Wilhelm, John Arthur (B.S., Tulane University). *Biochemistry*. Dissertation: "Partial Characterization Of Histone Acetylation In Hela Cells"
- Zander, Richard Henry (B.A., Hiram College; M.A., Duke University). *Botany*. Dissertation: "Revision Of The Genus *Leptodontium* (Musci) In The New World"
- Zerbe, Richard Ollis (B.A., University of Oklahoma). *Economics*. Dissertation: "The Economics Of Air Pollution: General Analysis And Specific Application"
- Zikmund, Barbara (B.A., Beloit College; B.D., Duke University). *Religion*. Dissertation: "Asa Mahan And Oberlin Perfectionism"
- Zinn, Grover Alfonso, Jr. (B.A., Rice University; B.D., Duke University). *Religion*. Dissertation: "History And Contemplation. The Dimensions Of The Restoration Of Man In Two Treaties On Noah's Ark By Hugh Of St. Victor"

Advanced Degrees Conferred September 1, 1969

Master of Arts

Allen, Barbara Joan
Allen, Virginia Grimes
Auerbach, Stephanie Kilby
Baade, Anne Adams Johnston
Bagby, Nancy Rogers
Boggs, Wade Hamilton, III
Burns, Sandra Lynn
Camp, Wilda Campbell
Carlson, Patricia Ann
Coose, Alonzo L., Jr.
Comette, James Archie, Jr.
Cronin, Thomas Wells
Dabbagh, Rassool Abdulla
Davis, James Edward
DeVita, Claudia M.
Dey, Jonathan Paul
Evans, Jay Alan
Field, Michael Ehrenhart
Finn, James Kenneth
Geraci, Vincent John
Gustafson, Steven Carl
Hancock, Carol Jean
Harkins, Anna Marie
Hudson, Carolyn Brauer
Judd, James Brian
Kearney, Mark
Lane, Nancy Marie

Lytle, Leslie Thomas
Markovs, Robert Atis
Matchette, Robert Berry
McCann, Susan Martin
McClare, Alan David
McNab, James Potter
Meredith, Robert Leonard
Molnia, Bruce Franklin
Nichols, Doris C.
Nixon, Eileen Marie
Nutt, William Rodger
Opperman, Jeannette Beatrice
Prevar, John Edward
Pyle, Gerald Jackson, Jr.
Ramm, Hartmut
Sattin, Dana Bruce
Schueler, Robert Alan
Snare, John Langford
Stehman, Charles Frederick
Strickland, William R.
Thrall, Meredith
Tutt, David Walton
Varnell, William Glenn
Varty, Ruth Liggette
Villanueva, Elia Eminent
Westerman, Ira John

Master of Arts in Teaching

Ambrose, Richard Dale
Anderson, Peggy Moon
Broda, Martha Simpson
Broyhill, Lawrence C.
Burton, William Preston
Cain, Barbara Tate
Camden, Rodney Carl
Childs, Robert Darwin
Cooper, Elizabeth Thompson
Crawley, Ronald Maddry
Farrior, Sarah Jerome
Garrison, Roger Wallace
Goodman, Martha Kessler
Haslett, Bonnie
Herb, Richard Lee
Hurt, Howard Preston
Jackson, Jerry L.
Kelly, Joe Eldon
Knapp, Sharon Estes
MacAlpine, Ian Reycraft

Magee, Elaine Faye
Margerison, Patricia Stacy
McCullough, David W.
McDowell, Larry Jerome
McGraw, Geoffrey Ray
Miller, Margaret McGrane
Misenheimer, Lynne Terry
Moore, Sara Valeria
Morgan, Cheryl Anne
Morgan, Mary Futterer
Morrison, James Franklin
Muse, Virginia Anne
O'Toole, James Francis
Palmer, Thomas Edwin
Reid, Willard Sharp
Roberts, David Lee
Rothgery, David Bruce
Satterwhite, Richard Thomas
Self, Janet Leslie
Smith, Jane Waller

Stackelberg, Cora Sleighter
Tanata, Norma Jean
Teitelbaum, Morton Cary
Utter, Robert Dewey

Vizzini, Charles T., Jr.
White, Edward Franklin, Jr.
Zumstein, Ray Theodore

Master of Education

Anderson, McCutchen Brooks
Childs, Jane Siren
Gibson, David Vincent
Hunter, John Albert
Knaus, Susan Joyce
Mauldin, Billy Edward

Meadows, Leeanne Reetz
Nurkin, Rita Webster
Poole, Jimmy Kay
Sullivan, Madeline Anne
Wilkerson, Sandra Stewart
Zeft, Jean Ann Abelson

Master of Science

Banerjee, Ashoke
Bhattacharya, Amalendu
Di Caprio, Umberto
Gupta, Rajinder Mohan

Moore, Gerald Keith
Schell, Robert Johnson
Shieh, Stanley Chin-nan
Tyrer, Harry Wakeley

Doctor of Education

- Fulford, William Edward, Jr. (B.S., North Carolina State University; M.A., East Carolina University). *Education*. Dissertation: "The Legal Aspects Of Property Rights And Public Education"
- Reising, Robert William (A.B., Michigan State University; M.A., University of Connecticut). *Education*. Dissertation: "Literature And Sports: A High School Textbook Employing A Thematic Approach To The Study Of Literature"
- Schultz, Richard Henry (B.S., Wisconsin State University; M.A., Appalachian State University). *Education*. Dissertation: "A Survey Of Nonpublic High Schools Of North Carolina"
- Wilson, Ernest Frank (A.B., University of North Carolina; M.A., University of Denver). *Education*. Dissertation: "A Study Of Predictors Of Academic Success Of Graduate Students Of The Resident School Of Engineering (AFIT) As The Predictors Of Post Graduation Job Effectiveness"
- Williams, Frank Canon (B.E.E., Georgia Institute Of Technology; B.D., South-western Baptist Theological Seminary). *Philosophy*. Dissertation: "Scientific Explanation by Covering Laws"
- Wood, James Benjamin (B.S., M.S., University of Wisconsin). *History*. Dissertation: "The American Response To China, 1784-1844; Consensus Policy And The Origin Of The East India Squadron"

Doctor of Philosophy

- Anderson, David Hezekiah (B.S., University of Mississippi; M.A., University of California). *Mathematics*. Dissertation: "A Study Of Certain Subspaces Of A Measure Algebra"
- Anna, Timothy Eagan (A.B., M.A., Duke University). *History*. Dissertation: "Mexico City In The War Of Independence, 1810-1821"
- Au, Shu-fun (A.B., New Asia College; M.A., Duke University). *Botany*. Dissertation: "Vegetation And Ecological Processes On Shackleford Bank, North Carolina"
- Bailey, John Clark (A.B., Cornell University; M.A., Duke University). *Chemistry*. Dissertation: "An Electron Spin Resonance Study Of The Morpholinium 7,7,8,8-Tetracyanoquinodimethan Complex Salts"

- Barber, Virginia Price (A.B., Randolph-Macon Woman's College; M.A., Duke University). *English*. Dissertation: "The Poetics Of William Carlos Williams"
- Barnes, Ralph Willet, Jr. (B.S.E.E., Duke University; M.S.E., University of Pennsylvania). *Electrical Engineering*. Dissertation: "Application Of Moving Target Indicator Techniques To Diagnostic Ultrasound"
- Berger, Thomas Leland (A.B., Dartmouth College; M.A., Duke University). *English*. Dissertation: "A Critical Old-Spelling Edition Of Thomas Dekker's *Blurt, Master Constable* (1602)"
- Bower, Leonard George (A.B., University of Arizona). *Economics*. Dissertation: "Population Growth, Economic Growth And Family Planning Programs In Less Developed Countries"
- Breckenridge, George Bryan (M.A., Glasgow University; M.A., Duke University). *Political Science*. Dissertation: "The Government Of Scotland. A Study In A Sub-Federal System"
- Browne, John Charles (B.S., Drexel Institute of Technology). *Physics*. Dissertation: "Fine Structure Of Analog States In ^{61}Cu , ^{63}Cu And ^{65}Cu "
- Chapin, Gene Lee (A.B., Long Beach State College). *Economics*. Dissertation: "A Study Of Labor Market Information Theory In The South African Economy"
- Cooper, Fraser Barry (A.B., University of British Columbia; M.A., Duke University). *Political Science*. Dissertation: "Existential Phenomenology And Marxism. The Politics Of Maurice Merleau-Ponty"
- Cooper, Joel (A.B., City College of New York). *Psychology*. Dissertation: "The Role Of Personal Responsibility In The Arousal Of Cognitive Dissonance"
- Delse, Frederick Charles (B.S., Massachusetts Institute of Technology; M.D., Duke University). *Psychology*. Dissertation: "Human Vertex Slow Potential Shifts During Auditory Judgments: Electrical Signs Of Change In Set"
- De Lucia, Frank Charles (B.S., Iowa Wesleyan College). *Physics*. Dissertation: "Millimeter And Submillimeter Molecular Beam Masers"
- Duch, David Stanley (B.S., University of Scranton). *Biochemistry*. Dissertation: "Isolation And Characterization Of An Endogenous Inhibitor Of Dopamine- β -Hydroxylase"
- Dunning, William Calvin (B.S., Union College; M.A., Duke University). *Mathematics*. Dissertation: "On The Solution Of Cubic Equations In A Finite Field"
- Epps, Thomas Wakefield (A.B., Rice University). *Economics*. Dissertation: "Financial Asset Prices. A Theoretical And Empirical Study"
- Fair, Richard Barton (B.S.E.E., Duke University; M.S., Pennsylvania State University). *Electrical Engineering*. Dissertation: "High Resolution Ion Beam Deposition Of Thin Metal Films"
- Fasanella, Edwin Lane (B.S., North Carolina State University). *Physics*. Dissertation: "Electron Spin Resonance Studies Of Irradiated Single Crystals Of L-Tyrosine Hydrochloride And L-Phenylalanine Hydrochloride"
- Fisher, Benjamin Franklin (A.B., Ursinus College; M.A., Duke University). *English*. Dissertation: "Gothic Techniques In Poe's Short Stories"
- Ganchrow, Donald (B.S., Brooklyn College). *Psychology*. Dissertation: "Thalamocortical Gustatory Projections In Rat And Marmoset"
- Ganchrow, Judith Jay (A.B., Carleton College; M.S., Brown University). *Psychology*. Dissertation: "Neural Encoding Of Gustatory Intensity And Quality"
- Gasper, Louis Clement (B.S., Duquesne University). *Economics*. Dissertation: "Organized Crime: An Economic Analysis"
- Ginter, Beverly Kennedy (A.B., M.A., Stanford University; M.L.S., University of California at Berkeley). *English*. Dissertation: "The Hierarchy Of Knighthood In Sir Thomas Malory's *Morte Darthur*"
- Graham, Daniel Arthur (B.S., West Texas State University). *Economics*. Dissertation: "Toward A Dynamic Theory Of The Firm"
- Griffin, James Ray (B.E., M.S., Vanderbilt University). *Electrical Engineering*. Dissertation: "Analysis And Synthesis Of Microwave Networks With Stub Resonators"

- Grimson, Roger Connell (B.S., University of North Carolina at Chapel Hill). *Mathematics*. Dissertation: "Enumeration Of Rectangular Arrays"
- Hackett, Harold Edmund (B.S., M.S., University of Miami). *Botany*. Dissertation: "Marine Algae In The Atoll Environment: Maldive Islands"
- Hamilton, James Lowell (A.B., Grinnell College). *Economics*. Dissertation: "Regulation And Congestion In The Markets For Flue-Cured Leaf Tobacco"
- Hass, George Michael (A.B., Northwestern University). *Biochemistry*. Dissertation: "Physical And Chemical Characteristics Of Crotonase"
- Helminger, Paul Andrew (B.S., North Carolina State University). *Physics*. Dissertation: "Submillimeter Wave Rotational Spectra Of Ammonia And Phosphine"
- Hewett, Barbara Burton (A.B., Duke University). *Psychology*. Dissertation: "Concept Attainment And Transfer As A Function Of Stimulus Structure"
- Howard, Kenneth Lawson (B.S., M.A., University of Massachusetts). *Botany*. Dissertation: "Taxonomy And Morphology Of Aquatic Phycomycetes Of Iceland"
- Johnston, William Ross (A.B., LL.B., M.A., University of Sydney). *History*. Dissertation: "'Sovereignty And The Savage': A Study Of British Jurisdictional Imperialism In The Late Nineteenth Century"
- Killackey, Herbert Patrick (A.B., University of California at Los Angeles). *Psychology*. Dissertation: "The Function Of Striate And Temporal Visual Cortex In The Tree Shrew"
- Lobb, Barry Lee (B.S., Lafayette College; M.A., Duke University). *Mathematics*. Dissertation: "A Study Of Uniformity-Dependent Dimension Functions"
- Meier, Michael McDaniel (B.S., Saint Procopius College). *Physics*. Dissertation: "Neutron Polarization For (d,n) Reactions In The ^{16}O Shell"
- Milton, Emmette Ohmer (A.B., Swarthmore College). *Mathematics*. Dissertation: "Asymptotic Behavior Of Transforms Of Distributions"
- Mohan, Radhe (B.S., M.S., Punjab University). *Physics*. Dissertation: "Isospin Mixing In Nuclei"
- Morris, Robert Lyle (B.S., University of Pittsburgh). *Psychology*. Dissertation: "Factors Affecting The Maintenance Of The Pair Bond In The Blond Ring Dove"
- Nutting, David Francis (A.B., Brown University). *Physiology*. Dissertation: "A Study Of The Biological Activities Of Cyanogen Bromide Fragments Of Bovine And Porcine Growth Hormone"
- O'Keefe, Charles Francis, Jr. (A.B., Saint Peter's College). *Romance Languages*. Dissertation: "The Shadowy Image: A Study Of Ambiguity, Truth, And Narcissism In Stendhal's *Armance*"
- Page, Sally Riggsbee (A.B., Wake Forest University; M.A.T., Duke University). *English*. Dissertation: "Woman In The Works Of William Faulkner"
- Paige, Harvey Leland (A.B., Alfred University; M.A., Duke University). *Chemistry*. Dissertation: "Preparations, Properties And Reactions Of Bis(Trimethylsilyl)-Aminochlorodimethylaminoborane And Its Derivatives"
- Pinion, Dallas Oliver (A.B., M.S., University of Richmond). *Chemistry*. Dissertation: "Heterocyclic Syntheses Based On 3-Acyl-1,4,5,6-Tetrahydropyridines"
- Pridgeon, Charles Taylor, Jr. (A.B., College of William and Mary; M.A., Duke University). *English*. Dissertation: "Insanity In American Fiction From Charles Brockden Brown To Oliver Wendell Holmes"
- Raiford, Maurice Terrell (B.S., Guilford College; M.A., College of William and Mary). *Physics*. Dissertation: "Statistical Dynamics Of Quantum Oscillators, Parametric Amplification In A Single Mode, And Related Topics"
- Ramm, Dietolf (A.B., Cornell University). *Physics*. Dissertation: "Pressure Studies In Solid D_2 And Solid H_2 "
- Riddick, Daniel Howison (A.B., M.D., Duke University). *Physiology*. Dissertation: "The Influence Of Norepinephrine On Cation Transport In Duck Erythrocytes"
- Rosenthal, Myron (B.S., Trinity College; M.S., University of Connecticut). *Phys-*

- iology*. Dissertation: "The Metabolic Response To Direct Stimulation Of The Intact Cerebral Cortex And Its Modification By Barbiturates"
- Ross, John Ray (A.B., Greensboro College; M.A.T., M.A., Duke University). *History*. Dissertation: "'Pork Barrels' And The General Welfare: Problems In Conservation, 1900-1920"
- Sasser, William Earl, Jr. (A.B., Duke University; M.B.A., University of North Carolina at Chapel Hill). *Economics*. Dissertation: "A Finite-Sample Study Of Various Simultaneous Equation Estimators"
- Schneider, Judith Morganroth (A.B., Barnard College). *Romance Languages*. Dissertation: "The Poetic Theories And The Poetry Of Max Jacob"
- Schneider, Martin Frederick (B.S., Yale College). *Physiology*. Dissertation: "Studies Of The Linear Alternating Current Cable Properties Of Frog Sartorius Muscle Fibers With Consideration Of Models For Fiber Impedances"
- Seder, Paul (A.B., Oberlin College). *Psychology*. Dissertation: "Some Determinants Of Attribution Of Offensive And Defensive Behavior In A Conflict Situation"
- Seldon, James Ralph (A.B., Carleton University). *Economics*. Dissertation: "Some Aspects Of Canadian Immigration Policy Theory And In Practice"
- Sensenig, John (B.S., M.S., North Texas State University). *Psychology*. Dissertation: "Self Exposure To Information As A Function Of Decision Certainty And Direction Of Information"
- Slinn, Ronald John (B.S., Sydney University; M.S.F., University of Melbourne). *Forestry*. Dissertation: "Public And Private Forestry Enterprises In Relation To National Forestry Production Goals"
- Stevens, Charles Joseph (A.B., Ursinus College; M.A., Duke University). *Political Science*. Dissertation: "International Law In Colonial And Imperial Conference Discussions"
- Thomason, Richard Sumner (B.S., Louisiana State University). *Physics*. Dissertation: "Neutron Polarization In (d,n) And (³He,n) Stripping Reactions On Low-A Nuclei"
- Wagner, Carl George (A.B., Princeton University). *Mathematics*. Dissertation: "Interpolation Polynomials Over The Function Fields GF (q, x)"
- Weaver, Robert Franklin (A.B., College of Wooster). *Biochemistry*. Dissertation: "Isolation And Properties Of A Respiratory Inhibitor From The Gill Tissue Of The Sporulating Common Meadow Mushroom (*Agaricus Bisporus*)"
- Weaver, Theodore Walker, III (A.B., Carleton College; M.A., University of Montana). *Botany*. Dissertation: "Gradients In The Carolina Fall-Line Sandhills: Environment, Vegetation, And Comparative Ecology Of The Oaks"
- Weeks, Claire Ovrut (B.S., City College of New York). *Biochemistry*. Dissertation: "A Study Of The Leucyl-t-RNA's And Leucyl-t-RNA Synthetases Of *Neurospora Crassa*"
- Weigant, Leo Augustus (A.B., M.A., University of Michigan). *English*. Dissertation: "The Manners Tradition And Regional Fiction In Nineteenth-Century America"
- Weiss, Harvey Richard (B.S., City College of New York). *Physiology*. Dissertation: "The Formation Of A Whole Number Ratio Of Heart Rate And Breathing Frequency: The Peripheral Physiological Mechanisms"
- Werrell, Kenneth Philip (B.S., United States Air Force Academy; M.A., Duke University). *History*. Dissertation: "The Tactical Development Of The Eighth Air Force In World War II"
- Wildgen, John Kevin (A.B., Gonzaga University; M.A., Duke University). *Political Science*. Dissertation: "The Politics Of Autonomy In the Valle d'Aosta"

Fellows, Scholars, and Assistants

American Cancer Society Fellow

Rothstein, Thomas L. *Physiology & Pharmacology.*

Angier B. Duke Fellow

McNab, James P. *Romance Languages.*

Burlington Industries Fellow

Armstrong, Robert N. *Mechanical Engineering.*

Committee on International Studies Fellows

Beach, Stephen. *Sociology.*
Bennett, Eldon J. *Political Science.*
Brown, Thomas A. *History.*
Burger, Thomas. *Sociology.*
Calkins, Richard. *Economics.*
Callaghan, William S. *History.*
Clements, Barbara. *History.*
Hass, Paula. *Sociology.*
Hines, Samuel. *Political Science.*
Holden, Merle C. *Economics.*
Huber, Peter. *Anthropology.*
Huntington, Richard. *Anthropology.*
Jablonski, James. *Sociology.*
Karanastagsoglou, Thomas A. *Economics.*
Menning, Bruce. *History.*
Pietarinen, Ilmari. *Economics.*
Thursby, Gene R. *Religion.*

Coretta Scott King Award

Wolfskill, Ethel. *History.*

Danforth Apprentice Teaching Fellows

Brandstadter, Michael. *History.*
Byrne, Kevin B. *History.*
Carlson, Patricia. *English.*
Cohen, Ralph A. *English.*
Dowda, Robert E. *Religion.*
Dueck, Abram J. *Religion.*
Gilbert, William. *English.*
Hayes, William. *Religion.*
Horton, Fred L., Jr. *Religion.*
Johnson, Paul R. *Religion.*
King, Herman T. *History.*
Kline, Lawrence O. *Religion.*
Little, James C. *Religion.*

Loftis, Alton. *English*.
Lohman, William. *English*.
McCann, Susan. *English*.
Meredith, Robert. *English*.
Osterink, Carole. *English*.
Payne, David. S. *History*.
Schultz, Louis. *History*.
Sweets, John F. *History*.
Thomson, Thomas J. *History*.
Tumolo, Joanne E. *English*.

Danforth Campus Minister

Settle, Carl. *History*.

Danforth Graduate Fellow

Lein, Clayton. *English*.

Dempster Fellow

Johns, R. Dick. *Religion*.

Departmental Awards

Garrett, Eddie J. *Forestry*.
McDowell, Maxson J. *Microbiology*.
Stein, Barry A. *Electrical Engineering*.
Varma, Hari K. *Mechanical Engineering*.

Departmental Fellows

Barreto, Luis S. *Forestry*.
Cordell, Charles E. *Forestry*.
Freund, Robert. *Economics*.
Goers, Frederick A. *Forestry*.
Graham, William A., III. *Forestry*.
Orchard, Terence J. *Forestry*.
Pech, Gyula. *Forestry*.
Sites, William H. *Forestry*.
Warner, Donald B. *Mechanical Engineering*.

Doris Duke Russian Affairs Fellow

Jones, William M. *Political Science*.

Dupont Teaching Fellow

Campbell, Henry F. *Chemistry*.
Francis, Russell J. *Physics*.

E. M. Carroll Fellows

Fitzgerald, Rosalie B. *History*.
Offenhauer, Priscilla. *History*.

Fiber Industries Fellow

Amond, Carl A. *Chemistry.*

Free University of Berlin Exchange Fellows

Bird, Keith W., Jr. *History.*

Grewe, Hartmut. *Political Science.*

Jepsen-Foge, Dietrich. *Political Science.*

Wiser, James L. *Political Science.*

George E. Norman Fellow

Koo, Tuck Kwan. *Religion.*

Graduate Assistants

Alberte, Randal S. *Botany.*

Alexander, Elaine E. *Mathematics.*

Alexander, Nancy J. *Botany.*

Amoss, Clinton W. *Chemistry.*

Baker, Catherine. *Chemistry.*

Barkas, Alexander E. *Zoology.*

Barling, Lesley A. *Zoology.*

Belani, Suresh G. *Mechanical Engineering.*

Braxton, Laura A. *Chemistry.*

Bryant, Andrew L. *Botany.*

Buckingham, Barbara-Jo. *Zoology.*

Burt, Kathleen M. *Botany.*

Capoor, Ram. *Mechanical Engineering.*

Cheney, Paul R., Jr. *Physics.*

Chevarley, Frances M. *Mathematics.*

Clark, William W. *Physics.*

Comerford, Stephen E. *Mathematics.*

Conde, Louis F. *Botany.*

Damgaard, Jacqueline. *Psychology.*

Davidson, Darwin E. *Botany.*

Day, F. Howard. *Chemistry.*

Delp, Phil G. *Forestry.*

Deng, Tung-Chiang. *Electrical Engineering.*

Dickinson, Richard B., Jr. *Chemistry.*

Diegnan, Glenn A. *Chemistry.*

Dirlam, Edward M. *Chemistry.*

Ellis, Elizabeth C. *Chemistry.*

Feagin, Mary A. *Zoology.*

Featherman, Sidney I. *Chemistry.*

Gailey, Kenneth D. *Chemistry.*

Garvey, R. Michael. *Physics.*

Gatz, Arthur J. *Zoology.*

Geen, Alfred F. *Geology.*

Giles, Harold F. *Chemistry.*

Gilman, Lee B. *Chemistry.*

Graham, David M. *Chemistry.*

Green, Cornelia S. *Chemistry.*

Hallinan, E. Ann. *Chemistry.*

Halsey, Susan D. *Geology*.
 Hardyman, G. Felda. *Mathematics*.
 Harris, Jerry L. *Physics*.
 Hartley, Ernest A. *Botany*.
 Hawks, Richard L. *Chemistry*.
 House, V. Dwight. *Mathematics*.
 Hutton, James D. *Physics*.
 Jewell, Richard M. *Education*.
 Johnson, David. B. *Chemistry*.
 Karlson, Ronald H. *Zoology*.
 Kava, Ruth A. *Zoology*.
 Komson, Richard C. *Chemistry*.
 Kurtz, David C. *Mathematics*.
 Lindsay, John H. *Botany*.
 Lisowski, Paul W. *Physics*.
 Lurie, Patricia L. *Geology*.
 Luther, Lynda. *Mathematics*.
 Lytle, Joyce. *Chemistry*.
 Marek, Louis, Jr. *Zoology*.
 Marnett, Lawrence J. *Chemistry*.
 Mayo, Louis A., Jr. *Zoology*.
 McAlpin, Bruce W. *Botany*.
 Melack, John M. *Zoology*.
 Middlebrook, John L. *Chemistry*.
 Molina, Gerardo A. *Chemistry*.
 Monrad, John R. *Geology*.
 Myers, Emily R. *Botany*.
 Neilson, Robert H. *Chemistry*.
 Neu, Martha J. *Chemistry*.
 O'Connor, Richard D. *Education*.
 Pedroni, Paul Lester. *Physics*.
 Polemenakos, Sotiros C. *Chemistry*.
 Pratt, Franklin P. *Geology*.
 Prokos, Craig P. *Zoology*.
 Romans, Alice Y. *Chemistry*.
 Rooney, William S. *Geology*.
 Rowe, James M. *Physics*.
 Sattler, Krista M. *Zoology*.
 Saunders, Alan H. *Education*.
 Schaefer, Robert E. *Chemistry*.
 Scharver, Jeffrey D. *Chemistry*.
 Septon, Lois F. *Chemistry*.
 Sharber, Virginia. *Chemistry*.
 Shepherd, Jan M. *Chemistry*.
 Smith, Alan P. *Botany*.
 Sulkin, Stephen D. *Zoology*.
 Tanaka, Yasuomi. *Forestry*.
 Taylor, John W. *Chemistry*.
 Trivedi, Harit P. *Physics*.
 Van Den Berg, William. *Physics*.
 Watkins, Graham K. *Zoology*.
 Weidlich, Wayne H. *Botany*.
 Williams, Larry D. *Botany*.
 Williamson, Gary F. *Zoology*.
 Wormer, Paul E. S. *Chemistry*.
 Wright, George. *Chemistry*.

Yeager, William M. *Physics*.
Zehr, David R. *Zoology*.
Zigler, J. Samuel. *Zoology*.

Graduate Fellows

Aiken, Susan. *English*.
Anderson, Bruce W. *Sociology and Anthropology*.
Arend, Lawrence. *Psychology*.
Ashley, Kathleen M. *English*.
Babad, Elisha Y. *Psychology*.
Babad, Yael E. *Psychology*.
Barton, James D. *Romance Languages*.
Blade, Thomas A. *Political Science*.
Boudreaux, Gregory R. *Philosophy*.
Bowman, George, *Sociology and Anthropology*.
Briggs, Gary G. *Psychology*.
Brown, Robert E. *Political Science*.
Buehler, John N. *Psychology*.
Carney, Elizabeth D. *Classics*.
Cheatham, James E. *Music*.
Dexter, Caroline E. *Classics*.
Ford, Steven J. *Romance Languages*.
Foster, Ellen. *Classics*.
Goodman, Douglas R. *Economics*.
Hansen, Richard E. *English*.
Hines, Samuel M., Jr. *Political Science*.
Innis, Nancy K. *Psychology*.
Johnson, Roderick V. *Philosophy*.
Kennedy, John G. *English*.
Kostyu, Joel A. *Anatomy*.
Kuonen, Ernest A. *Mechanical Engineering*.
Langford, Roberta B. *English*.
Lutsk, Bruce M. *Education*.
McDougall, Derek J. *Political Science*.
Methven, Ian R. *Forestry*.
Mullen, Whitney P. *Education*.
Murphy, Kathleen. *English*.
Nelson, Molly S. *Music*.
Poyart, Louis M. *Civil Engineering*.
Roberts, Linda A. *German*.
Rowe, William John. *Philosophy*.
Russell, Robert J. *Anatomy*.
Schmickle, William E. *Political Science*.
Shaver, Daniel L. *Philosophy*.
Simmons, Jennie C. *German*.
Soile, Isiaq O. *English*.
Sparling, Russell. *English*.
Spear, James H. *Philosophy*.
Staloff, Hazel A. *Political Science*.
Stephens, Peter D. *Philosophy*.
Stern, Thomas E. *Forestry*.
Strasser, Marylynn J. *English*.
Vande Berg, Marsha. *German*.

Graduate Scholars

- Adelson, Kenneth. *Economics*.
Ames, John J. *Religion*.
Atkinson, Margaret. *Music*.
Aull, James S. *Religion*.
Balnave, Peter A. *Physiology*.
Bandujo, Nicanor. *Romance Languages*.
Bauzon, Leslie E. *History*.
Bennett, Eldon J. *Political Science*.
Berlin, Barry P. *Economics*.
Blank, Frederick M. *Economics*.
Boggs, John R. *Education*.
Bohley, Cheryl A. *Physiology*.
Boulton, Wayne G. *Religion*.
Bradford, William. *English*.
Brady, Kent L. *Physiology*.
Brandon, William. *Political Science*.
Breytspraak, Linda. *Sociology and Anthropology*.
Brown, Mary K. *Sociology and Anthropology*.
Brown, Thomas A. *History*.
Bryant, Willa C. *Education*.
Buckley, Suzann. *History*.
Budesza, Carol L. *Sociology and Anthropology*.
Burger, Thomas. *Sociology and Anthropology*.
Bybee, Howard C. *Romance Languages*.
Byrne, Donald E. *Religion*.
Chapman, Judith. *Sociology and Anthropology*.
Cherniack, Saralee. *Psychology*.
Clarke, Harold. *Political Science*.
Clarke, Mary Jane. *Political Science*.
Clements, Barbara E. *History*.
Coad, Bruce E. *Education*.
Collier, Charles. *Economics*.
Collins, Daniel. *Sociology and Anthropology*.
Cooke, Harry L. *Education*.
Coty, James. *Sociology and Anthropology*.
Crowder, N. David. *Sociology and Anthropology*.
Daflos, Michael J. *Sociology and Anthropology*.
Dane, Kenneth. *Sociology and Anthropology*.
Del Boccio, Frank A. *Sociology and Anthropology*.
Deng, Tung-Chiang. *Electrical Engineering*.
Dozier, James L. *Hospital Administration*.
Draper, Imogene H. *Education*.
Epanchin, Alexis. *Education*.
Evans, Jeanne M. *Physiology*.
Fairbairn, James R. *Religion*.
Feldman, Mark I. *Hospital Administration*.
Fong, Anne C. *Romance Languages*.
Fraser, Diane. *Sociology and Anthropology*.
Frasure, Dorothy. *Romance Languages*.
Frederick, Stephen. *Religion*.
Gentle, Brian G. *Religion*.
Gilmore, Virginia. *Sociology and Anthropology*.
Gitter, Martin. *Economics*.
Goodman, Robert L. *Physiology*.

Cough, Robert A., Jr. *Economics*.
 Gwinn, Diane G. *Education*.
 Hardy, Douglas L. *Economics*.
 Harms, Jan C. *Forestry*.
 Hartley, Russell G. *Economics*.
 Haulk, Charles. *Economics*.
 Hausrath, Linda. *Mathematics*.
 Heeren, John. *Sociology and Anthropology*.
 Henderson, Eleanor E. *Classics*.
 Holden, Merle C. *Economics*.
 Hollyday, Margaret A. *Physiology*.
 House, V. Dwight. *Mathematics*.
 Humphrey, Binnie E. *Romance Languages*.
 Jacobson, Neil. *Anatomy*.
 Jones, William M. *Political Science*.
 Judkins, Wayne. *Mathematics*.
 Karanastasoglou, Thomas. *Economics*.
 Kirkham, Donald H. *Religion*.
 Kovit, Leonard. *Sociology and Anthropology*.
 Kurtz, David C. *Mathematics*.
 LaFond, Jean B. *Hospital Administration*.
 LeGoff, Jean-Pierre. *Romance Languages*.
 Leibowitz, Susan E. *Romance Languages*.
 Lenhardt, Wayne A. *Philosophy*.
 Loch, Laura S. *Education*.
 Loken, Mark K. *Economics*.
 Maddox, Donald L. *Romance Languages*.
 Mason, George. *Anatomy*.
 Matchette, Robert B. *History*.
 McCarter, Linda. *History*.
 McDaniel, Lester R. *Education*.
 Miao, Greta. *Sociology and Anthropology*.
 Minicucci, Richard F. *Hospital Administration*.
 Miyake, Akiko. *English*.
 Moody, Walton S. *History*.
 Moreland, Larry W. *Political Science*.
 Morrow, Lance F. *History*.
 Muhlemthaler, Philip D. *Hospital Administration*.
 Mulligan, Winifred B. *History*.
 Myers, Terry O. *Physiology*.
 Nunnery, Stacy A. *Hospital Administration*.
 Orchard, Terence J. *Forestry*.
 Papageorgiou, Demetrios. *Economics*.
 Pietarinen, Ilmari. *Economics*.
 Pitman, John C. *Education*.
 Poss, Barry. *Sociology and Anthropology*.
 Potts, Louis W. *History*.
 Pratt, Lindsay P., Jr. *Religion*.
 Price, Robert E. *Religion*.
 Proctor, Eugenia. *Psychology*.
 Pryor, John P. *Education*.
 Purdy, Joyce. *Physiology*.
 Quinn, Wylie S., III. *Religion*.
 Rackley, Sally A. *Classics*.
 Ramsey, Martha. *English*.
 Remnek, Richard. *Political Science*.

Reuss, Martin A. *History*.
 Ridenour, Norman. *History*.
 Robertson, Michael. *English*.
 Robinson, David. *English*.
 Roe, Jay T. *History*.
 Sandoval, Donald D. *Hospital Administration*.
 Schmidtke, James A. *History*.
 Schuette, George J. *History*.
 Scott, Joyce A. *Romance Languages*.
 Seaks, Terry G. *Economics*.
 Short, Larri A. *Physiology*.
 Smith, Nicholas. *Sociology and Anthropology*.
 Spalt, Allen E. *History*.
 Stauter, Mark C. *History*.
 Stein, Barry A. *Electrical Engineering*.
 Stokes, Randall G. *Sociology and Anthropology*.
 Tillman, Patricia A. *Sociology and Anthropology*.
 Toepel, Lori L. *Classics*.
 Tomek, James J. *Romance Languages*.
 Vance, Terry G. *Psychology*.
 Verich, Thomas. *History*.
 Walaskay, Paul W. *Religion*.
 Wendland, John C. *Music*.
 White, George C., Jr. *Sociology and Anthropology*.
 Whittington, Frank J. *Sociology and Anthropology*.
 Wiles, Paul M. *Hospital Administration*.
 Yesley, Joel M. *Economics*.
 Young, Larry H. *Hospital Administration*.

Gurney Harriss Kearns Fellows in Religion

Brannon, Emora T. *Religion*.
 Malinowski, Francis. *Religion*.
 Viviano, Benedict T. *Religion*.
 Wallace, Charles I., Jr. *Religion*.
 White, Charles D., Jr. *Religion*.

Halstead Fellows

Nay, Richard A. *Civil Engineering*.
 Secrest, Andrew. *History*.

Humanities Scholars

Cummings, Peter M. *Cooperative Program in Humanities*.
 Harris, Styron. *Cooperative Program in Humanities*.
 Jorgensen, Richard S. *Cooperative Program in Humanities*.

IBM Fellow

Lane, Malcolm G. *Mathematics*.

International Research and Exchanges Board Fellow

Menning, Bruce W. *History*.

James B. Duke Fellows

Budnitz, Norman A. *Zoology*.
Buxton, John H. *Psychology*.
Capps, Julia A. *Education*.
Chandler, Dewitt S. *History*.
Crowley, Terence A. *History*.
Donovan, Mary A. *Classics*.
Engel, John F. *Chemistry*.
Hakes, J. Edward. *Political Science*.
Hanigan, James. *Religion*.
Harper, John M. *Civil Engineering*.
Hosier, Paul E. *Botany*.
Lancaster, June D. *Microbiology*.
Latimer, Berkley W. *History*.
Madden, Janice. *Economics*.
Manton, Kenneth. *Sociology and Anthropology*.
McDowell, Maxson J. *Microbiology*.
Mishler, William T. *Political Science*.
Moore, Harold S. *History*.
Petridis, Anastasios. *Economics*.
Poss, Barry L. *Sociology and Anthropology*.
Shilliday, James M. *English*.
Stanton, Sherrie A. *Classics*.
Stevenson, Ruth. *English*.
Warner, Stanley E. *Economics*.
Weaver, John C. *History*.

Lilly Fellows

Douglass, Robert B. *Political Science*.
Graham, Stephen. *Political Science*.

Marshall and Sara Pickins Scholarship

Gardner, Dahl T. *Hospital Administration*.

Multiple Sclerosis Fellow

McMillan, Paul N. *Microbiology*.

National Aeronautics and Space Administration Fellows

Baker, Chadwick. *Electrical Engineering*.
Hagglund, Lee O. *Mathematics*.
Kay, Douglas A. *Mechanical Engineering*.
Painter, Richard G. *Biochemistry*.
Somers, Joseph H. *Chemistry*.
Wyse, Frederick C. *Physics*.

National Defense Education Act Title IV Fellows

Arroyo, Edward B. *Sociology*.
Baker, Catherine S. *Chemistry*.
Baldwin, Virgil C., Jr. *Forestry*.

Barkauskas, Anthony E. *Mathematics*.
 Barton, James R. *English*.
 Beach, Stephen. *Sociology*.
 Bean, Edward E. *Romance Languages*.
 Biggers, Sherrill. *Civil Engineering*.
 Bland, Robert N. *Philosophy*.
 Boggs, Wade H. *History*.
 Bordagaray, Christopher R. *History*.
 Brown, George R. *Physics*.
 Brown, Harry D. *Political Science*.
 Burdick, Diane. *English*.
 Burgess, Allan E. *History*.
 Butler, Harry S. *English*.
 Cady, Elizabeth. *English*.
 Carey, Roger N. *Chemistry*.
 Coble, Paul M. *Mathematics*.
 Cochran, Clarke E. *Political Science*.
 Colford, Elizabeth E. *Romance Languages*.
 Coppenhaver, Dorian. *Zoology*.
 Cordell, Charles E. *Forestry*.
 Cozart, David L. *Mathematics*.
 Cyronak, Charles A. *History*.
 Davis, John M. *Psychology*.
 DeChaine, James A. *Education*.
 DeGraaff, Robert M. *English*.
 Dimmey, Louis J. *Physics*.
 Dunaway, John M. *Romance Languages*.
 Elder, David T. *English*.
 Ellertson, Charles. *Philosophy*.
 Falcone, David. *Political Science*.
 Fawcett, Robert C. *Psychology*.
 Fisk, Charles L., Jr. *Economics*.
 Fitzgerald, Bruce D. *Economics*.
 Fitzsimmons, William T. *Sociology*.
 Fleshman, Russell C. *Education*.
 Gaddis, Steven E. *Civil Engineering*.
 Gallop, Marshall A. *Electrical Engineering*.
 Gamble, Susan R. *Philosophy*.
 Gentile, Anthony. *Economics*.
 Giberson, Linda L. *Economics*.
 Gillman, Diane J. *Romance Languages*.
 Gravetter, Frederick. *Psychology*.
 Greenwald, Olive E. *Zoology*.
 Greenwald, Stephen. *Botany*.
 Haines, Bruce L. *Botany*.
 Halford, Jake H. *Electrical Engineering*.
 Hanpeter, Frederick. *Philosophy*.
 Hass, Patricia S. *Economics*.
 Hausrath, Linda. *Mathematics*.
 Heeren, John W. *Sociology*.
 Herr, Richard A. *Political Science*.
 Hess, George A. *History*.
 Hitchcock, Walter B., Jr. *English*.
 Holloway, James, Jr. *Romance Languages*.
 Johnston, John F. *Economics*.
 Jones, Margaret K. *Mathematics*.

Kaba, Richard A. *Chemistry*.
 Kaiser, Kathleen E. *Sociology*.
 Keith-Lucas, Timothy. *Psychology*.
 Kelly, John T. *English*.
 Klein, Fritz F. *Electrical Engineering*.
 Lebedda, James D. *Chemistry*.
 LeClair, Thomas E. *English*.
 Lee, James S. *Political Science*.
 Lewis, James A. *History*.
 Liles, Jesse S. *Education*.
 Loveland, Franklin. *Anthropology*.
 Lowery, Martin. *Philosophy*.
 Lucansky, Terry W. *Botany*.
 Lukas, Victor T. *Anthropology*.
 Lynch, Edward J. *Political Science*.
 Macdonald, Mary N. *Microbiology*.
 Mason, George. *Classics*.
 McCulloch, Constance. *History*.
 McLaughlin, Samuel B., Jr. *Forestry*.
 McPherson, Kenneth A. *Economics*.
 Morse, Patricia A. *Biochemistry*.
 Mowbray, James A. *History*.
 Muething, Mary A. *Philosophy*.
 Murphy, Donald J., Jr. *Civil Engineering*.
 Nelson, Ronald O. *Physics*.
 Nunn, Charles F. *History*.
 Park, John H. *Romance Languages*.
 Paulus, Nancy J. *Education*.
 Peters, William C. *Physics*.
 Prochnow, Neal H. *Physics*.
 Pubantz, Jerret J. *Political Science*.
 Pulliam, Howard R. *Zoology*.
 Reid, Suzanne E. *Economics*.
 Robbins, David A. *Mathematics*.
 Rogers, Laurie E. *Economics*.
 Rose, Winfield H. *Political Science*.
 Rothenberg, Jerome. *Political Science*.
 Saks, Jerome. *Biochemistry*.
 Schueler, Robert A. *English*.
 Sinks, John D. *Philosophy*.
 Solomon, Harry M. *English*.
 Stein, Marshall D. *Microbiology*.
 Teeri, James A. *Botany*.
 Thompson, Charles A. *History*.
 Valentine, Robert Y. *Romance Languages*.
 Vest, James M. *Romance Languages*.
 Viti, Robert M. *Romance Languages*.
 Wallace, Shirley E. *English*.
 Weaver, Richard E., Jr. *Botany*.
 Williams, Gary L. *History*.
 Willis, Bernice. *Education*.
 Windham, Donald H. *Romance Languages*.
 Wiser, James L. *Political Science*.
 Whittington, Frank. *Sociology*.
 Zane, Leonard. *Physics*.

National Defense Education Act Title VI Fellows

Brown, Christine A. *Anthropology*.
Calkins, Richard A. *Economics*.
Cook, Gordon S., Jr. *History*.
Flynn, John M. *Political Science*.
Hahn, Jeffrey W. *Political Science*.
Koslofsky, Regis J. *Political Science*.
Kotzen, Nancy F. *Political Science*.
Thursby, Gene R. *Religion*.
Wall, John W. *Economics*.
Wilmot, Barbara M. *History*.

National Defense Education Act Title VI Fulbright-Hayes Fellows

Dionne, Russell. *History*.
Menning, Bruce W. *History*.
Reidinger, Richard B. *Economics*.

National Institutes of Health Physiology Trainees

McDonald, Dennis. *Zoology*.
Parrott, C. Christian. *Zoology*.
Raab, Jacob L. *Zoology*.
Wheeler, Alfred P. *Zoology*.

National Science Foundation Fellows

Bogges, Samuel F. *Botany*.
Bretz, William L. *Zoology*.
Brown, Evelyn W. *Zoology*.
Cook, Susan B. *Zoology*.
Cronin, Thomas W. *Zoology*.
Fruchtenicht, David C. *Botany*.
Goodman, Robert L. *Physiology*.
Gosline, John M. *Zoology*.
Harrington, Jonathan E. *Zoology*.
Hecky, Robert E. *Zoology*.
Kepner, Larry A. *Zoology*.
Lapenas, George N. *Zoology*.
Murdock, Gordon R. *Zoology*.
Petersen, Richard R. *Zoology*.
Proctor, Eugenia C. *Psychology*.
Rosenson, Leon M. *Zoology*.

National Science Foundation Trainees

Agnew, Elizabeth H. *Mathematics*.
Borleske, Stephen G. *Chemistry*.
Bostic, William. *Philosophy*.
Bruce, Richard C. *Psychology*.
Carter, Caroline E. *Zoology*.
Chamberlain, Brian K. *Biochemistry*.
Crim, Robert L. *Civil Engineering*.

Dean, Robert C. *Zoology*.
Diegnan, Glenn A. *Chemistry*.
Elliott, James R. *Physics*.
Fletcher, Stephen W. *Botany*.
Fraser, Diane K. *Sociology*.
Kavanagh, Eugene. *Biochemistry*.
Kramer, Thomas R. *Mathematics*.
Kronenfeld, Jerrold E. *Physics*.
Levin, Carolyn. *Sociology*.
Lutz, Jo-Ann. *Mathematics*.
McDowell, C. Blake. *Electrical Engineering*.
Miller, David E. *Electrical Engineering*.
Minick, Ann C. *Anthropology*.
Olshan, Arthur R. *Biochemistry*.
Patterson, David T. *Botany*.
Puzak, John Carl. *Chemistry*.
Roberts, Thomas N. *Physics*.
Starr, Bettie C. *Psychology*.
Steinbach, Wayne R. *Physics*.
Waterson, Robert. *Biochemistry*.
Webb, Geoffrey R. *Mathematics*.

New York State Regents Fellowship

Judkins, J. Wayne. *Mathematics*.

Oceanographic Trainees

Bornhold, Brian D. *Geology*.
Epifanio, Charles E. *Zoology*.
Kellogg, Charles W. *Zoology*.
Kilham, Susan S. *Zoology*.
Kruczynki, William L. *Duke Marine Lab*.
Murphy, Lynda S. *Zoology*.
Ruddiman, William F. *Duke Marine Lab*.

Ottis Green Fellows

Knapp, Richard F. *History*.
Malone, Michael T. *Religion*.
Remnek, Richard B. *Political Science*.

Prospective Teacher Fellows

Arrington, Jane C. *Education*.
Balderson, Jean A. *Education*.
Clarke, Suzanne. *Education*.
Clarke, Theodosia D. *Education*.
Corning, Alison S. *Education*.
Isaacson, Judith E. *Education*.
Lindberg, Sarah M. *Education*.
Thwaite, Susan G. *Education*.
Wheeler, Theodosia C. *Education*.

Research Assistants

Adams, Theodore C. *Chemistry*.
Alpay, Inan. *Civil Engineering*.
Anderson, Bruce. *Sociology*.
Ball, Anne P. *Microbiology*.
Banks, Donald W. *Physics*.
Baxa, Ernest G., Jr. *Electrical Engineering*.
Bhushan, Kul. *Civil Engineering*.
Borleske, Barbara J. *Chemistry*.
Boyce, James R., Jr. *Physics*.
Breen, Joseph J. *Chemistry*.
Chen, Zen. *Electrical Engineering*.
Cheuvront, Stephen C. *Physics*.
Chow, Ron-Yaw. *Electrical Engineering*.
Chuang, Tze-jer. *Civil Engineering*.
Chung, Kuo-San. *Electrical Engineering*.
Craske, Alfred G. *Botany*.
Cudlin, Joseph J. *Mechanical Engineering*.
Delgadillo, Claudio. *Botany*.
Dessent, Thomas A. *Chemistry*.
Dhar, Sachidulal. *Physics*.
Dibben, Martyn J. *Botany*.
Dickinson, Avery. *Anatomy*.
Feng, Yun-Ming. *Electrical Engineering*.
Foote, Robert S. *Chemistry*.
Fowler, David G. *Physics*.
Fox, Martin D. *Electrical Engineering*.
Fratcher, Nancy J. *Chemistry*.
Galbraith, James W. *Chemistry*.
Goellner, Gregory J. *Physics*.
Goethals, George R. *Psychology*.
Golson, James P. *Physics*.
Greenwald, Lewis I. *Zoology*.
Griffin, Brenda W. *Chemistry*.
Griffiths, Jonathan. *Chemistry*.
Gupta, Rajinder M. *Electrical Engineering*.
Hagen, Edward C. *Physics*.
Hardekopf, Robert A. *Physics*.
Harvey, Thomas J. *Zoology*.
Hatsell, Charles P. *Electrical Engineering*.
Hawks, Richard L. *Chemistry*.
Henderson, A. James, Jr. *Physics*.
Hilko, Robert A. *Physics*.
Hower, John F., Jr. *Chemistry*.
Hughes, William M. *Physics*.
Innis, Nancy K. *Psychology*.
Ismael, Nabil. *Civil Engineering*.
Johnson, George Allen. *Physics*.
Johnson, Ralph E. *Mathematics*.
Johnston, Daniel. *Electrical Engineering*.
Johnston, Mary Y. *Chemistry*.
Joshi, Vinaya. *Physics*.
Kaneko, Takeo. *Physics*.
Kauffman, Sidney L. *Electrical Engineering*.
Kilham, Peter. *Zoology*.

Koenig, Albert A., III. *Physics*.
 Lamaze, George P. *Physics*.
 Lau, Henry. *Mechanical Engineering*.
 Lawless, Philip A. *Physics*.
 Lawson, Dewey T. *Physics*.
 Lin, Chia-Sheng. *Zoology*.
 Lindstrom, Daniel. *Physics*.
 Lytle, Joyce. *Chemistry*.
 Lytle, Leslie T. *Chemistry*.
 Melton, Hewlett E. *Electrical Engineering*.
 Meredith, Philip L. *Chemistry*.
 Minnetyan, Levon. *Civil Engineering*.
 Moses, John D. *Physics*.
 Mueller, Karl H., Jr. *Physics*.
 Nelson, William H. *Physics*.
 Odening, Walter. *Botany*.
 Oechel, Walter C. *Botany*.
 Owens, Rufus D. *Chemistry*.
 Parkey, Sara R. *Chemistry*.
 Parulekar, Jayavant R. *Civil Engineering*.
 Peavy, Howard S. *Civil Engineering*.
 Perry, Noreen. *Chemistry*.
 Phillips, Theresa E. *Mathematics*.
 Pineo, William F. *Physics*.
 Polucci, Anthony J. *Physics*.
 Proctor, Eugenia C. *Psychology*.
 Pulliam, Howard R. *Zoology*.
 Ragan, Charles E., III. *Physics*.
 Raynaud, Daniel. *Civil Engineering*.
 Reber, James C. *Mathematics*.
 Reid, Suzanne. *Economics*.
 Reiss, Keith W. *Physics*.
 Rhea, Thomas C., Jr. *Physics*.
 Richard, Stephen E. *Chemistry*.
 Rosenberg, Allan P. *Physics*.
 Roy, Raymond. *Chemistry*.
 Sander, William. *Electrical Engineering*.
 Sanning, Kenneth J. *Chemistry*.
 Semeniuk, G. M. *Chemistry*.
 Shimada, Yutaka. *Electrical Engineering*.
 Smith, William M. *Physics*.
 Snider, Jerry A. *Botany*.
 Snow, T. Russell. *Physics*.
 Spalek, George. *Physics*.
 Staffa, Nickolas G., Jr. *Physics*.
 Stocks, Ronald. *Chemistry*.
 Taylor, Charles R. *Chemistry*.
 Taylor, John, Jr. *Physics*.
 Tiedeman, James S. *Physics*.
 Tobiessen, Peter L. *Botany*.
 Tucker, Robert K. *Oceanography*.
 Turner, Stephen R. *Chemistry*.
 Tyrer, Harry W. *Electrical Engineering*.
 Voigt, Charles. *Chemistry*.
 Walker, George L. *Chemistry*.

Wallace, Barnie A., Jr. *Physics*.
Ware, Carolyn B. *Psychology*.
Watanabe, Steven F. *Physics*.
Weber, James K., Jr. *Mathematics*.
Weck, Susan G. *Botany*.
Weinhaus, Frederick. *Physics*.
Wells, David T. *Psychology*.
Wilson, William M., Jr. *Physics*.
Winton, Raymond S. *Physics*.
Wortman, Camille B. *Psychology*.

Rockefeller Foundation Fellow

Weeks, Louis. *Religion*.

Shell International Studies Fellow

Gerstle, Frank P. *Mechanical Engineering*.

Southern Education Foundation Fellows

Bryant, Willa C. *Education*.
Sherrod, Earnest E. *Electrical Engineering*.

Sydnor Fellow

Puthoff, Elizabeth D. *History*.

Travel Awards

Armistead, Jack M. *English*.
Beach, Stephen. *Sociology*.
Bird, Keith W., Jr. *History*.
Buckley, Suzann C. *History*.
Bunker, Stephen. *Sociology*.
Burkholder, Mark A. *History*.
Hahn, Jeffrey W. *Political Science*.
Heitzenrater, Richard P. *Religion*.
Johns, Roger D. *Religion*.
Loveland, Frank. *Anthropology*.
Mancha, Philip E. *History*.
Mowbray, James A. *History*.
Reidinger, Richard B. *Economics*.
Remnek, Richard B. *Political Science*.
Ridenour, Norman H. *History*.
Sharp, Henry S. *Anthropology*.
Sussman, Robert. *Anthropology*.
Sweets, John F. *History*.
Thursby, Gene R. *Religion*.
Webbink, Patricia G. *Psychology*.
Windham, Donald H. *Romance Languages*.
Wiser, James L. *Political Science*.

United States Public Health Service Fellows

Casagrande, Vivien A. *Psychology*.
Cassel, Thomas Z. *Psychology*.
Ham, Donald L. *Forestry*.
Hudgins, Guy I. *Psychology*.
Malone, John C. *Psychology*.
Molina, Gerardo A. *Chemistry*.
Mowry, Fred L. *Forestry*.
Olivier, Thomas J. *Anthropology*.
Scott, Thomas R., Jr. *Psychology*.
Suter, Larry E. *Sociology*.
Wagor, Earl F. *Psychology*.
Ward, Lawrence M. *Psychology*.
Wiggins, Richard C. *Anatomy*.
Worchel, Stephen. *Psychology*.

United States Public Health Service Predoctoral Trainees

Adams, Donald W. *Psychiatry*.
Alexander, Bruce J. *Psychology*.
Anderson, Mary G. *Nursing*.
Anderson, Thomas W. *Physiology*.
Atencio, Frank W. *Psychology*.
Autor, Anne P. *Biochemistry*.
Ayers, Annette H. *Nursing*.
Ball, Anne P. *Microbiology*.
Balnave, Peter A. *Physiology*.
Barnes, Eugene M., Jr. *Biochemistry*.
Barton, Samuel. *Biochemistry*.
Beauchamp, Charles O. *Biochemistry*.
Berryhill, Judith R. *Psychology*.
Blankstein, Kirk R. *Psychiatry*.
Blasecki, John W., Jr. *Microbiology*.
Bleiberg, Joseph. *Psychology*.
Boe, Virginia L. *Psychology*.
Bohley, Cheryl A. *Physiology*.
Boyd, Monica. *Sociology*.
Brady, Frank O. *Biochemistry*.
Brady, Kent L. *Physiology*.
Breedlove, Joan B. *Nursing*.
Brown, Mary K. *Sociology*.
Brunovskis, Ilze V. *Microbiology*.
Budesza, Carol Lynn. *Sociology*.
Bunke, Sister Erika. *Nursing*.
Burchard, Sara N. *Psychology*.
Burke, Sister Dorothy. *Nursing*.
Carlson, William D. *Biochemistry*.
Carr, Elizabeth. *Nursing*.
Chapman, Judith B. *Sociology*.
Charlton, Ronald K. *Microbiology*.
Cheney, Richard W., Jr. *Biochemistry*.
Claus, Peter J. *Anthropology*.
Cleaves, Carol A. *Physiology*.
Clow, Harvey K. *Anthropology*.
Coch, Emily H. *Biochemistry*.

Cohen, Harvey J. *Biochemistry*.
 Collins, Daniel. *Sociology*.
 Cowgell, John. *Psychology*.
 Crowder, N. David. *Sociology*.
 Crowell, James S., Jr. *Microbiology*.
 Dean, Donna J. *Biochemistry*.
 DeGroof, Robert C. *Physiology*.
 Del Boccio, Frank A. *Sociology*.
 DeVoge, Justin T. *Psychiatry*.
 Dieterly, Mary E. *Physiology*.
 Dorf, Martin E. *Immunology*.
 Eisenman, Leonard M. *Psychology*.
 Evans, Jeanne M. *Physiology*.
 Farnill, Douglas. *Psychology*.
 Fehrenbach, Paul. *Psychology*.
 Ferris, Robert M. *Biochemistry*.
 Finn, Raymond F. *Psychiatry*.
 Fisher, Milton. *Psychiatry*.
 Fortney, Judith. *Sociology*.
 Gallagher, Kathleen. *Physiology*.
 Gartner, Jane E. *Psychiatry*.
 Gatz, Margaret. *Psychology*.
 Gerdes, John L. *Psychology*.
 Gilmore, Virginia. *Sociology*.
 Glenn, John F. *Psychology*.
 Gorman, Bobby J. *Biochemistry*.
 Graf, Lloyd H. *Microbiology*.
 Graham, Thomas C. *Pathology*.
 Grandstaff, Peter J. *Economics*.
 Grathaus, Emily Ann. *Immunology*.
 Gruenstein, Eric. *Biochemistry*.
 Grumet, Judy F. *Psychology*.
 Hamilton, Daniel L. *Microbiology*.
 Happel, Stephen K. *Sociology*.
 Harrington, Lesley W. *Physiology*.
 Hass, Paula H. *Sociology*.
 Hass, Rolland G. *Psychology*.
 Haverman, Isabel V. *Physiology and Pharmacology*.
 Hawkins, Barbara R. *Nursing*.
 Hawkins, Hal K. *Pathology*.
 Heck, Gerard L. *Psychology*.
 Hillson, Roger. *Psychology*.
 Hollyday, Margaret A. *Physiology*.
 Hooper, John A. *Biochemistry*.
 Howard, Irmgard M. *Biochemistry*.
 Huber, Peter B. *Anthropology*.
 Huber, Sally A. *Microbiology*.
 Huston, James S., Jr. *Biochemistry*.
 Jablonski, James. *Sociology*.
 Jacokes, Ruth. *Nursing*.
 Johnson, Carl A., III. *Psychology*.
 Johnson, James R. *Biochemistry*.
 Johnson, Jean R. *Biochemistry*.
 Kello, John E. *Psychology*.
 Kennington, Gregory. *Psychology*.
 Kessler, Dale L., Jr. *Pathology*.

Kovit, Leonard. *Sociology*.
 Krackow, Kenneth. *Pathology*.
 Krey, Lewis. *Physiology*.
 Lambe, Dean R. *Psychology*.
 Lancaster, June D. *Microbiology*.
 Lawson, Jasper J. *Psychology*.
 Ledbetter, Freeman H., Jr. *Biochemistry*.
 Lenthall, Gerard. *Psychology*.
 Lhotsky, Jan D. *Psychology*.
 Littleton, Christine E. *Microbiology*.
 Locke, Virginia O. *Psychology*.
 Lothstein, Leslie M. *Psychiatry*.
 Mabli, Jerome. *Psychology*.
 MacDonald, Victor. *Physiology*.
 Major, Leslie F. *Pathology*.
 Marcus, Carol. *Biochemistry*.
 Martinez-Vargas, Maria. *Psychology*.
 Marzluff, William. *Biochemistry*.
 McCord, Joe M. *Biochemistry*.
 McHale, Philip A. *Physiology*.
 McGillis, Daniel B. *Psychology*.
 McMillan, Paul N. *Microbiology*.
 Miller, Robert D. *Biochemistry*.
 Moffitt, Virginia C. *Sociology*.
 Mohl, Paul C. *Psychology*.
 Mohl, Paula C. *Psychology*.
 Monahan, Marcia. *Physiology and Pharmacology*.
 Myers, Terry O. *Physiology*.
 Nathans, Gene R. *Biochemistry*.
 Nichols, Margaret F. *Psychiatry*.
 Olsen, Kenneth W. *Biochemistry*.
 Page, Bonnelyn M. *Nursing*.
 Patrick, Clifford H. *Economics*.
 Patrick, Robert L. *Biochemistry*.
 Pilot, Mitchel C. *Biochemistry*.
 Pizzo, Salvator. *Pathology*.
 Plate, Charles. *Biochemistry*.
 Pletts, Lee Alice. *Biochemistry*.
 Polacco, Joseph C. *Biochemistry*.
 Polacco, Mary S. *Biochemistry*.
 Pollock, Elizabeth. *Pathology*.
 Porter, Pamela N. *Physiology and Pharmacology*.
 Pratt, Janet. *Nursing*.
 Purdy, Joyce E. *Physiology*.
 Raff, Emma. *Physiology*.
 Ramsey, Maynard, III. *Mechanical Engineering*.
 Raney, Curtis. *Sociology*.
 Reyling, Theodora R. *Microbiology*.
 Rinella, Vincent J., Jr. *Psychology*.
 Rives, Norfleet W., Jr. *Economics*.
 Robinson, Kathryn E. *Nursing*.
 Rueger, David C. *Biochemistry*.
 Ryali, Rajagopal. *Sociology and Anthropology*.
 Ruth, Robert D. *Sociology*.
 Saloman, Mark I. *Psychology*.
 Sanders, Lee. *Pathology*.

Schecter, Norman M. *Biochemistry*.
 Schell, Pamela. *Nursing*.
 Schwartz, Jared N. *Microbiology*.
 Schwartz, Martin L. *Pathology*.
 Serow, William J. *Economics*.
 Shapiro, Kenneth. *Psychology*.
 Sharp, Henry S. *Anthropology*.
 Shelburne, John D. *Pathology*.
 Shepherd, Richard N. *Physiology and Pharmacology*.
 Short, Larri A. *Physiology and Pharmacology*.
 Sigmon, Mary Elizabeth. *Microbiology*.
 Smith, Ruth M. *Nursing*.
 Sprague, Rick. *Psychology*.
 Stagman, Terry. *Psychology*.
 Sullivan, Karen A. *Microbiology*.
 Sussman, Robert W. *Anthropology*.
 Thielen, Ralf J. *Sociology*.
 Thomas, Kenneth. *Biochemistry*.
 Tillman, Patricia A. *Sociology*.
 Townsend, Richard E. *Psychology*.
 Van Putten, Carolyn L. *Psychology*.
 Wall, Judy D. *Biochemistry*.
 Waller, Elizabeth. *Nursing*.
 Waterbor, Robert B. *Pathology*.
 Wentworth, David F. *Microbiology*.
 Wexler, Marjorie A. *Microbiology*.
 Whatley, Judith L. *Psychology*.
 White, George Cary. *Sociology*.
 White-Stevens, Rodric. *Biochemistry*.
 Whiting, John D., Jr. *Biochemistry*.
 Wilkinson, Thomas H. *Forestry*.
 Wilson, Eunice M. *Nursing*.
 Wilson, Sandra A. *Nursing*.
 Wilson, Wilkie A. *Electrical Engineering*.
 Winge, Dennis R. *Biochemistry*.
 Worchel, Mona. *Sociology*.
 Wortman, Camille B. *Psychology*.
 Wright, Edith. *Physiology*.

United States Steel Foundation Fellow

Myers, Samuel M., Jr. *Physics*.

W. T. Laprade Fellow

Ritchie, Pierre L. *History*.

Woodrow Wilson Dissertation Year Fellows

Hedlin, Myron W. *History*.
 Helgerson, John L. *Political Science*.
 Honhart, Michael W. *History*.
 Koehler, Margrit. *Sociology*.
 Ness, Gary C. *History*.
 Sugar, Conrad E. *English*.
 Sykes, Thomas M. *Political Science*.



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BULLETIN OF DUKE UNIVERSITY

Undergraduate Instruction
1970



Annual Bulletins

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Undergraduate Instruction
1970-1971

Durham, North Carolina 1970

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Number 6

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Stephen Cannada Harward, A.B., C.P.A., *Assistant Secretary and Controller*

Edwin Constant Bryson, LL.B., *University Counsel*



University Calendar 1970-1971

1970

September

- 15 Tuesday, 7:30 p.m.—Orientation begins: assemblies for all new students entering Trinity College, The Woman's College, the School of Engineering, and the School of Nursing
- 17 Thursday—Registration and matriculation of freshmen students of Trinity College, The Woman's College, the School of Engineering, and the School of Nursing
- 18 Friday—Registration and matriculation of all new and non-pre-registered students in the Graduate School; Trinity College, The Woman's College, School of Engineering, and the School of Nursing transfer and returning students who have not pre-registered
- 19 Saturday—Final registration of preregistered students
- 20 Sunday—University Convocation
- 21 Monday—Fall semester classes begin

October

- 31 Saturday—Last day for reporting six-weeks grades

November

- 16-19 Preregistration for spring semester 1971
- 25 Wednesday, 12:30 p.m.—Thanksgiving recess begins
- 30 Monday, 8:10 a.m.—Classes are resumed

December

- 11 Friday—Founders' Day
- 19 Saturday, 12:30 p.m.—Christmas recess begins

1971

January

- 4 Monday, 8:10 a.m.—Classes are resumed
- 16 Saturday, 12:30—Fall semester classes end
- 18–20 Monday, Tuesday, Wednesday—Fall semester reading period
- 21 Thursday—Final exams begin
- 30 Saturday—Final exams end

February

- 4 Thursday—Registration and matriculation of new students
- 6 Saturday—Last day for matriculation for spring semester
- 8 Monday—Spring semester classes begin

March

- 20 Saturday—Last day for reporting six-weeks grades
- 27 Saturday, 12:30—Spring recess begins

April

- 5 Monday, 8:10 a.m.—Classes are resumed
- 12–15 Preregistration for Summer Session and fall semester 1971
- 30 Friday—Spring weekend, classes not held

May

- 1 Saturday—Spring weekend, classes not held
- 20 Thursday, 5:00 p.m.—Spring semester classes end
- 21–22 Friday, Saturday—Reading period
- 24 Monday—Final exams begin

June

- 2 Wednesday—Final exams end
- 5 Saturday—Commencement begins
- 6 Sunday—Commencement Sermon
- 7 Monday—Graduating exercises

General Information

The University

Duke, a privately supported, church-related (Methodist) university, has about 8,000 students enrolled in nine schools and colleges. The students annually represent nearly every state and sixty-five foreign countries. There are now more than 45,000 alumni in seventy nations. The University is a member of the Southern Association of Colleges and Schools, and of the Association of American Universities, which consists of forty-one outstanding institutions.

The Undergraduate Colleges

Trinity College

Trinity College is responsible for the academic and social affairs of Duke undergraduate men in the arts and sciences. Its program is built around the development of a challenging, liberal curriculum, of honors work for able students, and effective academic counseling services. Cultural-intellectual cocurricular programs and a residential program combining faculty association with self-government are also a part of Trinity. Although Trinity shares the faculty of arts and sciences with The Woman's

College and the Graduate School, twenty-five faculty members serve as Fellows of the College.

The Woman's College

The Woman's College combines the benefits of a small residential liberal arts college with those of a major university. As members of the residential College, students govern themselves and live within a twelve-unit house system on a well-defined portion of the larger campus. The residents of each house represent all four college classes, diverse geographical origins, and varying skills and intellectual interests. Many classes and most of the College activities center on The Woman's College (East) Campus; but women students share in a wide variety of academic, cultural, and social activities on the West (Men's) Campus. A shuttle bus between campuses assures accessibility to all points.

School of Engineering

The undergraduate program is designed to provide the opportunity for students to prepare for successful practice of the profession, for continuing personal cultural development, and for satisfying and responsible citizenship. Curricula are soundly based upon mathematics and the physical sciences; however, the engineering student also selects a number of courses in the liberal arts and is a member of a community with a liberal arts tradition. As a matter of policy, the School is relatively small, with a selected undergraduate enrollment of about 450. The undergraduate program receives the benefits of association with a strong graduate engineering program of instruction and research.

School of Nursing

The program of undergraduate study in nursing offers an opportunity for selected high school graduates to earn the professional degree of Bachelor of Science in Nursing. The objectives of the curriculum are: (1) to provide opportunities for gaining the basic knowledge, skills, and attitudes of the developing professional nurse; (2) to provide the foundations for continued learning and study; and (3) to provide students with information which can equip them to function both as nurses and as citizens in a changing society. As a part of the University community, the School of Nursing serves its students as the focus of a total educational experience that only a major university can provide.

The Objective of a Liberal Education

Woodrow Wilson described the objective of a liberal education as "the wholly awakened man." Though the four years in college may not

seem long enough to achieve this noble ideal, at the least they prepare one for the life-long awakening. A bachelor's degree is not an end, it is a beginning. Graduation, from the Latin work *gradum*, step, marks one more stride along the way.

The idea of a liberal education, like all great ideas, eludes precise definition, but in every age men have tried to express this abstraction by describing its results. They have always fallen short, because any definition is a system of limitations. For example, a nineteenth-century master at Eton told his students:

You go to a great school not so much for knowledge as for arts and habits; for the habit of attention, for the art of expression, for the art of assuming at a moment's notice a new intellectual position, for the art of entering quickly into another person's thoughts, for the habit of submitting to censure and refutation, for the art of indicating assent or dissent in graduated terms, for the habit of regarding minute points of accuracy, for the art of working out what is possible in a given time, for taste, for discrimination, for mental courage and mental soberness.

—William Johnson Cory

This is helpful, but the questing student will surely wish for something further, something even more explicit about the abilities, attitudes, and customs essential to a liberal education.

At Duke University, as at every school dedicated to the liberal tradition, it is the faculty that must, in the final analysis, determine the specific content of the four-year curriculum offered for those who pursue a liberal education. And in constructing that curriculum, the faculty have taken into account these aims:

First, an educated man will acquire at least some experience in the three divisions of human knowledge and inquiry:

the world of nature—the physical and life sciences;
the world of man in relation to man—the social sciences;
the world of spirit and imagination—the humanities.

The objective is a man capable of thinking in the markedly different ways represented by these three divisions; for each of them he will familiarize himself with the appropriate method and idiom as well as the particular purpose and scope.

Second, an educated man will concentrate in one discipline to enjoy the returns to be derived from intensive and specialized work.

Third, an educated man will learn to read his native language with ease and accuracy; what is more, he should develop a life-long desire to read avidly and with discernment.

Fourth, an educated man will master his native language with sufficient skill to write it with vigor and precision.

Fifth, an educated man will read, write, and speak competently at least one foreign language. Apart from any utilitarian purpose it may serve, this objective leads to an understanding of a foreign culture and at the same time affords a fresh awareness of one's own tongue and society.

And finally, a liberally educated man will acquire historical, artistic, philosophical, and spiritual perspective. An exposure to the deeds and dreams of great minds in the unending struggle to reconcile power and principle, an awareness of the ways in which men have defined beauty, a knowledge of the best in ancient thought, and an appreciation of the values men have found in the Judaeo-Christian heritage must instill a contempt for the meretricious and the second-rate.

In short, a liberal education should help a man to know, to understand, to decide, and to express: to know the facts or how to find them, to understand those facts with insight and perspective, to decide only after understanding and conscious evaluation, and to express those decisions with ease and grace. These are not the sum of a liberal education, but they go far to assist the wholly awakened man in his unceasing quest to live with dignity and sensitivity in our complex world and to participate in the values and common purposes that infuse our civilization.



Programs of Study and Requirements for Degrees

Duke University offers in Trinity College and The Woman's College programs of study which lead to the degrees of Bachelor of Arts and Bachelor of Science; and in the School of Engineering the degree of Bachelor of Science in Engineering. Within the four-year curriculum of each college or school, the student has the major responsibility for devising and carrying through a course program appropriate to his goals and background. He will be assisted in this task by departmental directors of undergraduate studies, supervisors of freshmen instruction, faculty advisers, and by academic deans of his school or college.

Trinity College and The Woman's College

Academic programs in Trinity College and The Woman's College are designed for students who desire to major in one of the following subjects: accounting, anthropology, art, botany, chemistry, economics, elementary education, English, French, geology, German, Greek, history, Latin, management sciences, mathematics, music, philosophy, physical education for women, physics, political science, psychology, religion, Russian, sociology, Spanish, and zoology. In addition to majoring in one of these subjects or in an approved interdisciplinary program, a student must complete courses in other disciplines and satisfy certain requirements relating to quality of academic work and residence in the

college. A portion of the curricular and credit requirements for both the Bachelor of Arts and Bachelor of Science degrees may be satisfied through the Advanced Placement Program of the College Entrance Examination Board undertaken before enrollment in the colleges.

Starting with the academic year 1969-70, a new curriculum and new degree requirements were instituted and made applicable to entering students. For students in the Classes of 1971 and 1972, the basic degree programs in effect at the time of their initial enrollment continue to apply, although certain aspects of the new curriculum and certain modifications of degree requirements are applicable. (See pages 17-23.)

The New Curriculum: Two Approaches to an Undergraduate Degree

As a program of studies leading to either the A.B. or B.S. degree, the new curriculum provides two distinctive approaches to each degree—Program I and Program II. In each case, the unit of academic instruction and credit is the semester-course (s.c.), which generally consists of three to four hours of instruction each week of the semester. Parts and multiples of the semester-course are also recognized, such as half-courses and double-courses. Whenever the term course appears in this *Bulletin*, reference is to a semester-course unless otherwise indicated.

Program I

Program I provides a flexible approach to the A.B. or B.S. degree by enabling a student to choose within broadly stated requirements the particular academic subject matter which best satisfies his intellectual interests and educational goals. Although specific requirements exist regarding proficiency in English composition and foreign language and in physical activity, optional methods of satisfying those requirements are provided. Through a variety of small-group learning experiences and independent study, Program I assures each student the opportunity to undertake at least a portion of his undergraduate study in closer association with faculty and fellow students than may normally be provided in regular classroom instruction and large lectures. A detailed description of Program I is given below, with requirements for graduation explained in terms of curriculum, course credits, grade-average, and residence.

Program I Curricular Requirements

Distribution of Courses

Program I enables a student to achieve breadth of academic and intellectual experience by requiring that he complete a number of

semester-courses in each of the three divisions into which the academic departments of the University are grouped. The courses selected in each division must be those in which the essential subject matter and substance of the discipline are presented; thus, no introductory skill courses may be used to satisfy distributional requirements. (See the section below concerning Skill Courses.) The three divisions and the academic departments within each are:

Humanities: Art, Classical Studies (including Greek and Latin), English, Germanic Languages and Literature, Music, Philosophy, Religion, Romance Languages (including French, Italian, Portuguese, and Spanish), and Slavic Languages and Literatures (including Russian).

Natural Sciences and Mathematics: Botany, Chemistry, Geology, Mathematics, Physics, and Zoology.

Social Sciences: Economics, Education, Health and Physical Education (Woman's College), History, Management Sciences, Political Science, Psychology, and Sociology and Anthropology.

The number of courses which a student must pass in each of the three divisions is as follows:

First division. Each student must concentrate (or major) in a single discipline or in an interdisciplinary program. He will thereby be required to take a number of courses in that discipline or in that interdisciplinary program, as determined by the department or departments concerned. In so doing he will automatically complete courses in one of the three divisions described above. The division of the concentration or major is called the first division.

Second division. A student must pass at least four semester-courses in a second division of his own choice. None of these courses may be skill courses. (See section below regarding Skill Courses.) At least two of the four courses must be at the advanced level. Normally advanced-level courses are numbered in the 100- and 200-series, although there is some variation among the various departments. To satisfy this requirement, a student may select all four courses from one department within the division, or he may distribute the courses among two or more departments. To determine requirements for admission to advanced courses in a particular department, a student should consult that department's description of courses and its prerequisites.

Third division. A student must pass at least two semester-courses in a third division of his own choice. The courses may be at the introductory or advanced level; but, again, no skill courses may be used to satisfy the requirement. Both courses may be taken in one department within the division, or one course may be selected from each of two departments. In the latter case, however, a student should first determine that the course chosen is not part of a sequence of two courses (a so-called hyphenated course), both of which must be taken to obtain credit for either

course. He should also know the prerequisites for admission to courses which he selects.

Skill Courses. As noted previously, there is one general limitation upon the choice of courses for distributional purposes. Elementary skill courses may not be used to satisfy the distributional requirements in any of the three divisions. Rather, the courses must be those which present the essential subject matter and substance of the discipline in which the courses are found. For instance, neither English composition nor elementary foreign language courses count as courses in humanities, because developing skill in composition or speech is different from encountering linguistics or literature. Such courses, therefore, cannot be taken to satisfy distributional requirements in the humanities division. A similar restriction applies to the courses listed below. In planning course selections to meet distributional requirements, students should consult this list, not for purposes of avoiding such courses, but rather to assure that courses chosen to meet distributional requirements actually serve that purpose.

Skill Courses That Do Not Satisfy Distributional Requirements of Program I

<i>Department</i>	<i>Courses</i>
Art	53-54, 55, 56; 155, 156; 157, 158; 159, 160
Chinese	101-102 (Ch. Hill); 131, 132; 133, 134
Classical Studies	Greek 1-2; 63-64 Latin 1-2; 63-64
Education	105, 106, 107, 108, 151, 152, 153, 154, 161, 162, 195, 196, 201, 215, 216, 225, 226, 236, 237, 239, 241, 246, 266, 276.
English	1; 51, 65-66; 101; 103-104; 121, 122; 151
Germanic Languages and Literature	1-2; 63-64; 105, 117, 118
Health and Physical Education (Women)	P.E. 102, 103, 105-106, 117, 119S, 120, 132, 133, 181, 182, 185 H.E. 101-102, 134
Hindi-Urdu	181, 182; 183, 184
Japanese	151, 152; 153, 154
Music	5-6; 15; 57-58; 145-146; 151; 152; 153; 154; Applied Music
Psychology	117
Romance Languages	French 1-2; 63-64; 97, 98; 181, 182 Italian 1-2; 63-64; 181 Portuguese 181
Slavic Languages and Literatures	Spanish 1-2; 63-64; 97; 181, 182 1-2; 63-64

In addition, certain other courses, e.g., military science courses, do not satisfy distributional requirements since they are not included within the curricula of departments normally recognized as falling within any of the three divisions.

Proficiency in English Composition

Each student is required to demonstrate his ability to write good English by presenting either a score of 700 or higher on the College Entrance Examination Board (CEEB) English Composition Achievement Test, or by passing a semester-course (English 1) in English composition in the first semester of the freshman year. A student presenting a 700 or higher score on the CEEB Test satisfies the English composition proficiency requirement for graduation, but does not receive course credit for English 1. When the proficiency requirement is satisfied by passing English 1, that course counts among the thirty-two semester-courses required for graduation.

Proficiency in Foreign Language

A student must demonstrate proficiency in one foreign language equivalent to that achieved by the successful completion of the second year of that language at Duke. This requirement may be met by (1) presenting a satisfactory score on the CEEB Achievement Test in a foreign language; (2) presenting an acceptable score on the CEEB Advanced Placement Program Examination in French, German, Latin, or Spanish; (3) achieving a satisfactory score on the Duke University placement test in a foreign language; or (4) completing with a passing grade at Duke, French 64, German 64, Greek 64, Italian 64, Latin 64, Spanish 64, or Russian 64. Course credit toward graduation is given only for successfully completing language courses or for certain Advanced Placement Program work in language undertaken in high school; course credit is not given when the language proficiency requirement is satisfied by means of CEEB Achievement or Duke placement tests.

Candidates for the A.B. degree may satisfy the language requirement by showing a proficiency in any of the languages noted previously, although some departments do recommend a particular foreign language for their majors. However, candidates for the B.S. degree may be required by their major departments to be proficient in a particular foreign language. In this case, a student may be able to satisfy the foreign language requirement for graduation by the successful completion of his department's language requirement. To determine whether a department has special language recommendations or requirements for its majors, see its description of major requirements.

Learning Experiences

Another feature of Program I is the provision of small-group and independent learning experiences which a student is required to have as a part of his academic work.

Small-group Learning Experiences. To supplement the normal classroom and large lecture method of instruction, four types of small-group learning experiences are offered.

Seminar. A course, normally of twelve to fifteen students, in which, instead of hearing lectures, the student engages in discussion, develops skills, refines judgment, and has his ideas challenged.

Preceptorial. A preceptorial is a discussion between an instructor and no more than twelve students. It is an additional and optional unit attached to a regular course. It allows a student to carry his interest and learning in a particular subject further than that required in the regular class. If a regular class normally meets three times a week, the preceptorial would be a fourth one-hour meeting.

Discussion section. A discussion section is comprised of approximately ten students and an instructor in a group that is part of a regular course. It is distinguished from a preceptorial in that *every* student in the course participates in a discussion group, whereas the preceptorial is optional. The preceptorial is an opportunity for intensive additional study, whereas a discussion group is an integral part of a lecture course given to large groups.

Tutorial. A tutorial is a meeting between one instructor and one to three students, independent of any other course.

Courses or sections of courses offering the above small-group experiences are designated *S* (for seminar), *P* (for preceptorial), *D* (for discussion section), or *T* (for tutorial).

Independent Study, Including Independent Projects and Theses. One aspect of the philosophy underlying Program I is that a Duke student should be given latitude to choose, within broadly stated requirements and with good faculty advising, the academic courses that best suit his intellectual interests and educational goals. A related idea is that he should also be encouraged to assume—again, with faculty guidance and assistance—increasing responsibility for his own education as he proceeds toward graduation. Accordingly, Program I makes provision for independent study, particularly in the junior and senior years. Such study should enable a student to apply his knowledge and skills in a variety of ways toward the accomplishment of immediate academic goals, and also to cultivate a desire and capacity for continued self-education following graduation.

Independent study may take a variety of forms, depending upon the subject matter and research methods of the several disciplines, as well as upon the interests of students and the professors who supervise their

independent work. In some instances, it may consist of extensive reading and research in the literature of a discipline, followed by the writing of a substantial paper. In other cases, a student may prepare a laboratory research project, work in field research, or he may write or produce a play or compose a novel.

A special form of independent study, particularly for departmental majors, is the preparation of a thesis or the completion of a major independent project in the junior, but especially in the senior year. Again, the precise nature of the thesis or independent project will vary with the subject matter and research methods of the discipline in which it is undertaken. When undertaken in the senior year, independent study might serve any one of a number of valid educational purposes. For some students it would provide an opportunity for integrating their understanding of the disciplines in which they have majored. For others it would permit more intensive consideration of specific topics previously encountered but insufficiently explored. And for still others, it would be the occasion for truly original research and the development of new insights and knowledge within the disciplines. In any case, the senior thesis or independent project would represent a substantial endeavor in independent scholarship and research, and when used to its fullest potential, it could be the most rewarding educational experience in a student's undergraduate career.

Learning Experience Requirements. Students entering The Woman's College and Trinity College in 1969 and thereafter are required to have the following small-group and independent learning experiences, which were defined above:

1. *Freshman and sophomore years*

- a. A seminar in one semester of the freshman or sophomore year,
or
- b. Two preceptorials, discussion sections, or tutorials, or a combination of any two of these, to be taken at some time during the freshman and/or sophomore years.

2. *Junior and senior years*

- a. A combination of seminars or independent study, with credit equal to at least two semester-courses, or
- b. A thesis or an independent project at some time during the student's junior or senior year for which he would receive credit for two semester-courses.

These requirements are the minimum for both the A.B. and B.S. degrees. Although a student is not prohibited from enrolling in additional small-group sections or courses or in independent study beyond the required minimum, preference will be given to those needing such learning experiences to satisfy the above requirements.

Concentration

Although students in Program I are expected to achieve breadth of intellectual experience by taking courses in each of the three divisions of learning within the University, they are also expected to acquire some mastery of a particular discipline or interdisciplinary area. Each student must, therefore, concentrate a portion of his studies in a single department or in an approved interdisciplinary program. The former type of concentration is called the *departmental major*; the latter, *interdepartmental concentration*. In either case, the student must complete a sufficient number of courses to provide an understanding of the fundamental knowledge and methodology within the discipline or disciplines concerned.

Departmental Major. A student in Program I is likely to pursue a departmental major. In doing so he must pass a number of courses within the major department as specified by that department and approved by the faculty, as well as courses in other departments as may be necessary or helpful to effective performance in the major. The requirements of both types of courses are set forth in the section entitled Departmental Major following each department's course descriptions. A student should know those requirements when making his choice of major and also when planning his program of study for the future.

Interdepartmental Concentration. Some students in Program I may desire to pursue a plan of studies in two or more departments, rather than major in only one. The faculty, in planning and adopting the new curriculum, concluded that certain interdepartmental programs would be educationally sound and appropriate for some students. Accordingly, it approved the concept of an interdepartmental concentration as an alternate means of satisfying the concentration requirement of Program I.

A student concentrating in an interdepartmental program must pass a specified number of courses within each of the departments concerned, and may also be required to complete courses in other departments or show proficiency in other areas relevant to the objectives of the program.

Selecting and Declaring a Major or Interdepartmental Concentration. The selection of a departmental major or program of interdepartmental concentration is an important decision which each student must make sometime during the freshman and sophomore years. Not only is this choice significant for the student's immediate educational experience in college, but it is also essential in making later decisions regarding post-graduate study and career opportunities. A student should, therefore, carefully select his major or program of interdepartmental concentration.

Some students enter college with firm convictions about their academic interests and the departments in which they will major or concentrate. Most are less certain in this regard, however, and find it preferable to

determine their interests, as well as their capabilities, by taking a variety of courses in the first two or three semesters. Such an approach is not unreasonable if one remembers that majoring in a department involves more than simply completing a given number of courses in that discipline. Prerequisites, proficiency requirements, and sequence of courses must also be considered. As a result, a student who is uncertain about his major when entering Duke should understand the need for a timely decision in this regard, so that he may thereafter have sufficient time and flexibility in his scheduling to complete his requirements. In addition, he should know the requirements of those departments that best represent his general academic interests and possible major, and should take a course or two in those departments to test his interests and capabilities more specifically.

At Duke the formal designation of a major or interdepartmental concentration is referred to as declaring a major. A student may first declare his major in the spring semester of the freshman year, but he must make his declaration by the spring semester of the sophomore year. To do so, he completes a Declaration of Major form which he obtains from, and returns to, his academic dean. Upon receipt of the form, the student's name is sent to his major department, and he is assigned a faculty adviser in that department. Prior to the formal declaration, a student is advised in academic matters by his general faculty adviser and his academic dean. He is free, however, to consult with the director of undergraduate studies and the supervisor of freshman instruction in any of the departments about his academic interests and his plans for majoring in that department.

Concentration Requirements

Major. A major consists of at least five courses in one department above the introductory level. A department may not require a student for the A.B. degree to take more than eight semester-courses above the introductory level in the major, though the student may elect to do so. A department may not require a student for the B.S. degree to take more than ten semester-courses above the introductory level in the major, though the student may elect to do so. Foreign language departments may at their discretion begin their major after the elementary and intermediate courses. Otherwise, introductory courses are considered to occupy one-fourth of a student's time for the first year of study in a department. More intensive major programs may be offered for the student's election.

Interdepartmental Concentration. Interdepartmental concentration consists of at least three courses beyond the introductory level in each of two or more departments, and requires the approval of the directors of undergraduate studies in the departments concerned.

Advanced Work

As previously noted, a student in Program I must complete at least thirty-two semester-courses in an approved curriculum to graduate with an A.B. or B.S. degree. Of that number of courses, at least twelve must be at the advanced level. Normally, advanced-level courses are numbered in the 100- and 200-series, although there is some variation among the various departments. This requirement may be satisfied by passing advanced-level courses in any of the three divisions of learning earlier described. In satisfying the distributional requirement for the second division, a student will complete at least two advanced courses; he also will normally complete a number of such courses by meeting his major or interdepartmental concentration requirements. The remainder of the twelve may be taken as courses in the major, as distributional requirements, or as electives.

Physical Activity

All students are required to complete two years of approved physical activity unless excused for medical reasons. This requirement is normally met by satisfactory completion of two years in appropriate physical education activity courses offered by the Departments of Health and Physical Education. In special cases, an alternate form of physical activity may be approved by those departments as satisfying the requirement. Each student must begin to fulfill the requirement in his freshman year and ordinarily will be expected to complete the full requirement by the end of the sophomore year. Letter grades are assigned for performance in *required* physical education courses and alternate forms of physical activity; such grades are not considered, however, in calculating grade averages for purposes of graduation, continuation in college, or honors. Nor do physical education courses or alternate forms of physical activity count among the thirty-two courses needed for graduation. Nevertheless, each student must complete this requirement to be graduated.

Military Science Courses

No more than four courses in the military sciences may be counted among the thirty-two courses required for graduation. For students participating in either the Air Force or Naval ROTC program, the four courses for which graduation credit may be earned are normally taken in the junior and senior years. Enrollment in a few additional courses and laboratories is required in earlier years in order to fulfill requirements for an officer's commission. Although not counted toward graduation, such additional courses, if completed successfully, appear on a student's permanent academic record.

Program I Course Credit Requirements

To be graduated with either the Bachelor of Arts or Bachelor of Science degree, a student must pass at least thirty-two semester-courses, or their equivalent in terms of half-courses and double-courses, in an approved curriculum.

Program I Grade-Average Requirements for Graduation

Of the thirty-two semester courses required for graduation, twenty-two or their equivalent in terms of double-courses and half-courses, must be passed with grades of C— or better.

For purposes of this requirement, the average of grades received in two half-courses will be the equivalent of a grade in a semester-course; and the grade in a double-course will count as two semester-course grades of the same quality.

Program I Residence Requirements

Normal and Maximum Periods. Four academic years, that is, eight semesters, in residence is the normal amount of time a student may take to earn either the A.B. or B.S. degree. This period may be extended by one or two semesters when, in the opinion of a student's academic dean, legitimate reasons underlie the student's failure to be graduated in eight semesters, and reasonable grounds exist for expecting that such extension will enable the student to complete all remaining requirements for graduation. A student will not be permitted more than five academic years, that is, ten semesters, in residence in order to be graduated, unless he has been enrolled previously as a special student.

Minimum Period. At least sixteen courses including the courses of the final two semesters must be completed satisfactorily at Duke. A student who meets this requirement, but who lacks one course in final fulfillment of degree requirements may take this work in another institution of approved standing, provided the course is approved by his major adviser and academic dean.

Former students of The Woman's College who have been out of college for six or more years may take up to ten courses or thirty semester-hours of work in another institution of approved standing in final fulfillment of requirements, providing that (1) she was in good standing when she withdrew from Duke; (2) she proposes *in advance* a plan which ensures that the work to be taken elsewhere will be comparable to the work required at Duke; (3) she demonstrates that to return to Duke to complete the work for the degree would be either impossible or occasion

serious hardship; and (4) she is prepared to take Duke examinations on any courses taken elsewhere if required by the department concerned.

Program II: Individually Designed Plans of Study

Nature and Purpose

The second program leading to the Bachelor of Arts and Bachelor of Science degree is Program II. In general, this program offers the student who has a special interest or talent in a single field or an unusual combination of interests or talents in several fields, an opportunity to plan, with the counsel of a single department or an interdepartmental committee, a special curriculum of academic and related work adapted to the exceptional qualities the student possesses. Together, the student and his departmental Program II adviser design an individual plan of work for the whole or the remainder of the student's college career. They assess his background, needs, and ambitions and evaluate the resources of the University and those outside it as means of satisfying those ambitions. They consider what academic courses would be useful, but also consider other options. For example, a full semester or year of independent study equivalent to a normal course-load under Program I might be agreed upon; or a year-long work-study program off-campus or a period of residence and study abroad might seem most pertinent. Regardless of the features of a particular plan of work under Program II, each must be tailored to the special interests and talents of the student for whom it is designed.

Once the plan of work has been approved by the appropriate department or interdepartmental committee, it is presented to the supervisory Committee on Program II of the Undergraduate Faculty Council for approval. Upon endorsement by that committee, it becomes an obligation assumed by the student, though it may later be modified with the approval of the department or interdepartmental committee and the Committee on Program II. A description of the plan is prepared and is sent to the student's academic dean; each semester the student's progress in achieving the plan is reported to the dean.

Admission

A student interested in being considered for Program II may confer first with his academic dean about his eligibility for the program; if he appears eligible, he will be referred to the director of undergraduate studies in the department closest to his interest. Or the student may confer directly with the director or his delegate within the department. The director or his delegate, in consultation with the student, will decide whether Program II is appropriate for the student, that is, whether the

department will accept him into Program II, and whether an interdepartmental committee is needed. If he is accepted by the Committee on Program II of the faculty, he is formally designated a Program II student.

Normally, a student will be accepted into Program II only after he has been in residence at Duke for one or two semesters and has shown during that period that he possesses the necessary qualifications for admission. Nevertheless, a freshman who believes that he qualifies for Program II and desires to be admitted in his first semester at Duke, is invited to write the dean of freshmen of his college during the summer months preceding matriculation, providing him with a complete statement of his qualifications and plans as a prospective Program II student.

Because of the special qualifications needed for admission into Program II, as well as the great freedom permitted a student in selecting courses in Program I, it is anticipated that only a few students will enter Program II each year. Until accepted into Program II, a student should register for courses and satisfy curricular requirements as a Program I student. Upon acceptance into Program II, a student is relieved of most, but not all, requirements expected of Program I students. Should he leave Program II for any reason, he assumes all requirements of Program I.

General Requirements

Apart from the requirements arising from his approved plan of work, a Program II student must satisfy certain general requirements which are also applicable to students in Program I. These requirements have been set forth in the foregoing explanation of Program I, under the following headings: Course Credit Requirements, see page 15; Physical Activity, see page 14; Military Science Courses, see page 14; Grade-Average Requirement for Graduation, see page 15 above; Residence Requirements, see page 15. In this case, although the normal and maximum periods of residence explained on page 15 are applicable to students in Program II, the requirement relating to the last two semesters is subject to some adjustment if the student's approved plan of work necessitates his being absent from the University during a portion of the senior year.

Degree Requirements for Students in the Classes of 1971 and 1972

Candidates for the Bachelor of Arts and the Bachelor of Science degrees in these classes must satisfy requirements pertaining to curriculum, course credits, grade-average, and residence. The curricular requirements for each degree differ, and are described separately below; requirements relating to credits, grade-average, and residence are the same for each degree, and are described under common headings.

Curricular Requirements: Bachelor of Arts

For graduation with the degree of Bachelor of Arts, the following course work, or equivalent, must be completed in accordance with the academic regulations as stated in this *Bulletin*.

Uniform Courses

English	2
Foreign Language	4
Natural and Formal Sciences	2
Religion	1
Social Science and History	2
Humanities	2

Semester Courses

These requirements are described in detail below.

English. 2 s.c. This requirement is met by the completion of English 1-2.

Foreign Language. 4 s.c. or equivalent. The languages which meet this requirement are French, German, Greek, Hindi-Urdu, Italian, Latin, Russian, and Spanish. All students are required to demonstrate proficiency in a foreign language equivalent to that attained by completing the second college year of that language, either by passing the second year of the language at Duke or by passing an examination upon entrance to Duke University or any time thereafter. Proficiency may also be demonstrated by satisfactory performance, as determined by the appropriate department, on the CEEB Advanced Placement Program Examination in the language, or by qualifying for the third-year course in certain languages at Duke by attaining the following minimum scores on the CEEB Achievement Tests: French 91, 557; German 91, 572; Spanish 91, 624; and Latin 91, 640.*

Natural Science-Formal Science. 2 s.c. A student may satisfy this requirement by completing (1) two laboratory courses in one of the natural sciences (biology, chemistry, geology, or physics), (2) two courses in mathematics (except Mathematics 51), or (3) one course in mathematics (except Mathematics 51) and one course in logic (Philosophy 48).

Religion. 1 s.h. These courses may be selected from Religion 50, 52, 55, 57, 59.

Social Science and History. 2 s.c. These courses may be selected from a single department and from the following list: Economics 1-2 or 51-52, 132, 149, 150, 154; History 1-2 or 51-52; Political Science 11 or 61 to be followed by a political science course with a 100 number; Psychology 91

*CEEB Achievement Tests either are not available in Greek, Hindi-Urdu, Italian, and Russian, or have not been sufficiently validated at Duke to satisfy proficiency requirements. Students presenting CEEB Achievement Test scores in any of these languages should consult the director of undergraduate studies in the appropriate department at Duke about means of validating such scores.

or 92 or 93 and 94 (formerly 100) or 95 (formerly 121) or 101; or Sociology 91 to be followed by any sociology course numbered below 190, or Anthropology 93-94.

Humanities. 2 s.c. These courses may be selected from the following list, with both courses drawn from the same division of literature, philosophy, or art and music.

Literature: English 55-56, 57-58, 111-112, 125-126, 131-132, 137-138, 143-144, or any two consecutive courses in the series 173-176; Classical Studies 111-112 or 52, 121-122, or 51; or any two foreign language literature courses above 100 (not given in translation).

Philosophy 41, 42, 43, 44, 93, 94, 101, 109, 110, 111, 112, 116, 117, 119, 130, 132.

Art and Music: Art 51-52, Music 1-2, 51-52, or 125 followed by 134, 139, 163, or 165; Classical Studies 141-142 or 55-56.

Note that in social sciences and history the two courses must be in the same department; in the humanities, in the same division. Note also that in double-numbered courses, i.e., courses joined by a hyphen, both courses must be completed to fulfill the requirement in social science and the humanities.

Physical Education. Four activity courses in physical education are required for graduation and normally are completed by the end of the sophomore year.

Major and Related Work. The major work consists of six to eight semester-courses above the introductory level in one department. Each department specifies, with approval of the undergraduate faculty, the number of introductory courses required for the major, and approves the choice of higher level courses in the major. Whenever the department defines the major as eight semester-courses above the introductory courses, the student, with the prior approval of the director of undergraduate studies, may substitute two semester-courses at the 100- or 200-level in a related discipline for two of the eight courses.

Six semester-courses of related work must be taken in two or more other departments and are selected subject to the approval of the major department and academic dean of the appropriate college; ordinarily, related work may not include more than two semester-courses or one double-course open primarily to freshmen. With the consent of the department, however, majors in mathematics, the natural sciences, and science education may include as related work introductory courses in mathematics and the natural sciences. Courses satisfying the uniform course requirements may also be counted toward the requirements in major and related work; two uniform course requirements, however, may not be satisfied with the same course.

Elective Courses. In addition to the required uniform courses, physical education courses, and the major and related work described above, other courses must be elected to make a combined total of semester-

hours and semester-courses as specified and explained in the section on pages 21-22 concerning Credit Requirements.

Students whose programs of study permit may select a maximum of six semester-courses in engineering, forestry, or medical science. The courses elected in these subjects must be approved by the major department and by the student's academic dean.

Curricular Requirements: Bachelor of Science

For graduation with the degree of Bachelor of Science, the following course work, or equivalent, must be completed in accordance with the academic regulations as stated in this *Bulletin*.

<i>Uniform Courses</i>	<i>Semester Courses</i>
English	2
Foreign Language	4
Mathematics	2
Natural Science	2
Social Science and History	2
Religion	1
Humanities	2

These requirements are described below.

English. 2 s.c. This requirement is met by the completion of English 1-2.

Foreign Language. 4 s.c. or equivalent. The foreign language requirement for the B.S. degree is identical to that for the A.B. degree, except that the major department may specify the foreign language to be taken to satisfy the requirement. For a department's requirement in this respect, see its description of major requirements.

Mathematics. 2 s.c. This requirement may be met by completion of Mathematics 21 and 22 or 31 and 32.

Natural Science. 2 s.c. This requirement can be satisfied by courses in one of the natural sciences, namely, biology, chemistry, geology, or physics. The courses must include laboratory work.

Social Sciences and History. 2 s.c. This requirement is satisfied by courses selected from a single department and from the following list: Economics 1-2, 51-52, 132, 149, 150, 154; History 1-2 or 51-52; Political Science 11 or 61 to be followed by any political science course with a 100 number; Psychology 91 or 92 or 93 and 94 (formerly 100) or 95 (formerly 121) or 101; Sociology 91 to be followed by any sociology course numbered below 190 or Anthropology 93-94. (Double-numbered courses separated by a hyphen do not satisfy this requirement unless both courses are completed.)

Religion. 1 s.c. selected, before 1969-70, from 1, 2, 51, 52, 55, 85, 93, 105; and after 1968-69, from 50, 52, 55, 57, 59.

Humanities. 2 s.c. selected from the following list and in the same department: English Literature 55-56, 57-58, 111-112, 125-126, 131-132, 137-138, 143-144, or any two consecutive courses in the series 173-176; Classical Studies 111-112 or 52, 121-122 or 51; any two foreign language literature courses above 100 not given in translation; Philosophy 41, 42, 43, 44, 93, 94, 101, 109, 110, 111, 112, 116, 117, 119, 130, 132; Art 51-52; Music 1-2, 51-52, or 125 followed by 134, 139, 163, or 165; Classical Studies 141-142 or 55-56. (Double-numbered courses separated by a hyphen do not meet this requirement unless both courses are completed.)

Physical Education. Four physical education activity courses are required for graduation and normally are completed by the end of the sophomore year.

Major and Related Work. Major and related work consists of at least sixteen semester courses in the natural sciences. This work must be selected from the Departments of Botany, Chemistry, Geology, Mathematics, Physics, Psychology, and Zoology. The major work consists of a minimum of six semester courses above the introductory courses in one department. The choice of courses is subject to the approval of the department. Whenever the department defines the major as eight semester courses or more above the introductory courses, the student, with the prior approval of the director of undergraduate studies, may substitute two semester courses at the 100- or 200-level in a related discipline for two of the eight courses. The related work is taken in at least two other departments and is selected subject to the approval of the major department. With the consent of the department, majors in mathematics and the natural sciences may include as related work introductory courses in mathematics, the natural sciences, and science education. A minimum of four semester courses of related work is required, two semester courses of which must be in laboratory science. Courses fulfilling the uniform course requirements may also be counted toward the requirements in major and related work; two uniform course requirements may not be satisfied with the same course.

Elective Courses. In addition to the required uniform courses, physical education activity courses, and the major and related work described above, other courses must be elected to make a combined total of semester-hours and semester-courses as specified and explained in the section on page 22 concerning Credit Requirements.

Students whose programs of study permit may select a maximum of six semester-courses in engineering, forestry, law, medical science, or nursing. The courses elected in these subjects must be approved by the major department and by the student's academic dean.

Credit Requirements: Bachelor of Arts and Bachelor of Science

Since September, 1969, academic credit has been expressed in terms of semester-courses satisfactorily completed rather than semester-hours and

quality-point ratios. As a result, the permanent academic records of students in the Classes of 1971 and 1972, including transfer students and former Duke students readmitted to the colleges, reflect (a) courses taken before September, 1969, expressed in terms of semester-hours, together with letter grades, quality points, and quality-point ratios; and (b) courses taken after September, 1969, expressed in terms of semester-courses, double-courses, and half-courses, together with letter grades earned for each.

Because of the changes explained above, students in the Classes of 1971 and 1972 are required to complete a *combination* of semester-hours and semester-courses (or their equivalent in terms of double-courses and half-courses) according to the following table:

Students in the Classes of 1971 and 1972, including transfers and former students returning to Duke, who, by September 1, 1969

Have received credit,
exclusive of required
hours in Physical Education,
for:

Must complete
the following
number of courses:

22-24 semester-hours	28 semester-courses
25-27	27
28-30	26
31-33	25
34-36	24
37-39	23
40-42	22
43-45	21
*46-54	20
55-57	19
58-60	18
61-63	17
64-66	16
67-69	15
70-72	14
73-75	13
*76-84	12
85-87	11
88-90	10
91-93	9
94-96	8
97-99	7
100-102	6
103-105	5
106-108	4

*Reflects the fact that, effective September, 1970, the normal course load for all students will be four semester-courses.

Grade-Average Requirements for Graduation: Bachelor of Arts and Bachelor of Science

In addition to completing an approved curriculum, a student in the Class of 1971 or 1972, including a transfer or former student readmitted to Duke, must earn at least a *C*— average on the combined total of semester-hours and semester-courses *undertaken* as an undergraduate student. The academic work of the senior year, however, must average at least a *C*.

Residence Requirements: Bachelor of Arts and Bachelor of Science

The residence requirements for students in the classes of 1971 and 1972 are the same as for those under Program I of the new curriculum, as stated on pages 15-16.

Specialized Programs

A student who has chosen a particular field may wish to take more course work in a major or related discipline than is required by his major department. The following programs of study offer a guide in planning this work, especially as it applies to preparation for various professions or professional schools.

Undergraduate Programs

Accounting. A student may specialize in public or industrial accounting in his junior and senior years. In either case the following courses should be taken in the freshman and sophomore years:

Freshman year.

Mathematics 31 and 32
Management Sciences 50

Sophomore year.

Mathematics 68 and 51
Management Sciences 60, *Probability and Statistics for
Decision Problems*
Management Sciences 120, *Organization Theory*
Management Sciences 130, *Information Systems*
Management Sciences 140, *Operations Research*

Junior year.

Management Sciences 210, *Intermediate Theory of Economic
Enterprise*
Management Sciences 230, *Controllershship*
Management Sciences 231, *Financial Accounting*

Senior year.

Management Sciences 232, *Internal Control and Auditing*

Management Sciences 233, *Federal Income Taxation*

Management Sciences 234, 235 and 236, *CPA Preparation*

Biology—Interdisciplinary Programs. Modern biology meets and joins forces with many related fields. Examples of such interdisciplinary areas are: biomathematics, microbiology, molecular biology, oceanography, and psychobiology. Proper training for these and other areas may require work in two or several science disciplines to such depth that requirements for a conventional uni-departmental major program cannot be met in the allotted time. Any undergraduate who contemplates undertaking a graduate program in an interdisciplinary area involving biology should consult with the directors of undergraduate study of the fields concerned. They may, by joint consent, approve of major-related programs which differ from those concerned primarily with a single discipline. An interdisciplinary major student shall be considered a major in the department of his choice and be under the supervision of the director of undergraduate studies of that department. Interdisciplinary programs must be planned early in the undergraduate career, preferably starting with the freshman year.

Business Administration. Undergraduate work in business administration, including accounting, is offered in the Department of Management Science.

Teaching. Duke University is accredited by the National Council for Accreditation of Teacher Education for the preparation of elementary and secondary school teachers. The University's programs are also approved by the North Carolina Department of Public Instruction.

The program for students who intend to teach is designed to prepare for positions either in elementary or secondary schools. All prospective teachers must take Psychology 92 or 93, preferably during the sophomore year, and Education 100 or 113, preferably during the junior year. Only students with an over-all average of 2.0 in their major or teaching fields will be admitted to student teaching. Special methods courses, should be taken prior to undergraduate student teaching, which may be done in the senior year.

Whatever their majors, students must consult an appropriate member of the Department of Education prior to each registration period to assure that they meet the certification requirements of the states in which they wish to teach and that they have places reserved for them in student teaching.

Secondary-School Teaching. Students preparing to teach in a secondary school meet certification requirements by qualifying in one teaching field. Prospective secondary-school teachers must major in a subject other than education. Qualification for certification to teach a single

science may be sought under either the A.B. or the B.S. degree. Students desiring to major in science education should read carefully the description of that program given below.

Science Education Major. Students intending to teach sciences in secondary school may major in science education. The program meets certification requirements and provides a broad background in several sciences. Early consultation with an adviser in the Department of Education and a selected science department is required. Five courses in education (100 or 113, 118, 215, 216, 246 or 276) are required. The Science Education program provides the required two courses in mathematics, and laboratory work in at least three sciences, with concentration in one of these. University curriculum requirements account for a maximum of fourteen courses. The remaining eighteen are selected to provide breadth in at least three sciences and must include a minimum of four advanced courses. The general and professional courses required for certification may be met in part both by the University curriculum distribution and within the eighteen courses devoted to concentration.

A major in science education leads to a B.A. degree within the normal thirty-two course limit. Students wishing to have the B.S. degree may expect to take more than thirty-two courses. The normal number of courses may be reduced by advanced placement or proficiency tests in English and foreign language.

Elementary Education Major. This program is designed for those students who desire to meet the certification requirements for teaching in the elementary school.

Required general education courses. (These courses may be used to fulfill the general education requirement for the A.B. degree.)

English	1 course or by examination
Foreign language	4 courses or by examination
Biological science	2 courses
Mathematics 17 or 31	1 course
History 91-92	2 courses
Political Science 61	1 course
Economics 115 or 120	1 course
Literature	1 course
Psychology 92 or 93	1 course

Required specialized subject matter courses.

Physical Education 102	½ course
Health Education 134	½ course
Music Education 151-152	1 course
Education 161-162	1 course
Education 105	½ course
Education 106	½ course

Education 107	$\frac{1}{2}$ course
Education 108	$\frac{1}{2}$ course

Required professional courses.

Education 100 or 113	1 course
Education 118	1 course
Education 195	$\frac{1}{2}$ course
Education 196	$1\frac{1}{2}$ course

A major in elementary education must include the concentration of at least six courses in subjects commonly taught in elementary school, chosen from one of the divisions—humanities, natural science, or social science. The concentration may include courses from the general education requirement.

Preparation for Graduate and Professional Schools

Many graduate and professional schools require special tests for students seeking admission. Information regarding the test requirements should be obtained from the catalogues of the schools to which the student plans to apply. The University Counseling Center has available applications for required graduate and professional testing programs.

Graduate School. The student who plans to enter a graduate school of arts and sciences for advanced study should consult an adviser in the field of the proposed advanced study concerning suitable preparation. Most graduate schools have definite requirements in foreign languages for all students. Candidates for the degree of Doctor of Philosophy are required to pass reading examinations, usually in German and French. In some cases other languages may be substituted. As soon as practicable, the student should ascertain the requirements of the particular graduate school he desires to enter.

Graduate School of Business Administration. Students seeking advice concerning preparation for entrance to a graduate school of business administration may consult the Department of Management Sciences. Many graduate programs in business administration are designed specifically for students with little or no undergraduate work in business.

Some schools require at least one year of calculus for admission. Additional courses in mathematics can be very helpful, especially linear algebra, probability, statistics, and additional calculus. Other areas in which work can be of special value are philosophy of science and formal logic; one or more of the behavioral sciences, economics, and the physical sciences; and engineering.

Medical and Dental Schools. Students planning to enter a medical or dental school should arrange their programs of study from the first

semester so as to include those courses required by the professional schools of their choice. These courses usually include at least one year of English, two years of chemistry, and one year each of biology, mathematics, and physics. At Duke University the courses normally taken are English 1 and one or more literature courses, Chemistry 1, 2, 151, and 152, Biology or Zoology 11-12, Mathematics 31-32, and Physics 51-52. Most professional schools require ninety semester hours of college credit before consideration for admission. Because individual medical and dental schools strongly recommend or, in some cases require specific courses in addition to those listed above, it is wise for the student to be fully aware of any additional requirements established by the professional school of his choice.

The student should plan his program to meet major and graduation requirements. He may elect to major in the department of his choice, but should discuss his program with the premedical adviser, his major adviser, and his academic dean.

Law Schools. Students who plan to prepare for law school may select their major work in any field. They have often chosen the following courses: Management Science 57, 58; Economics 51, 52; English 55, 56; History 1, 2 or 51, 52, 105, 106; Philosophy 48 and 41; Political Science 61; or Sociology 91, 92.

For a fuller discussion of undergraduate preparation for the study of law, refer to the Duke University Announcement, *Studying Law at Duke*, obtainable at the Law School.

Theological Schools and Religious Work. The Divinity School of Duke University publishes as its own the official policy statement of the American Association of Theological Schools respecting undergraduate preparation for students expecting to enroll in graduate professional theological studies.

The student contemplating theological study should correspond at the very earliest opportunity with the school or schools to which he intends to apply and with the authorities of his church in order to learn what will best prepare him for the specific program he expects to enter. He will be likely to find under the guidance of the seminary that he should consider the following subjects:

English language and literature; history, including non-Western cultures as well as European and American; philosophy, particularly its history and its methods; natural sciences, both the physical and the life sciences; social sciences, where psychology, sociology, and anthropology are particularly appropriate; the fine arts and music, especially for their creative and symbolic values; Biblical and modern languages; religion, both in the Judaeo-Christian and in the Near and Far Eastern traditions.

Some seminaries require Greek or Hebrew for admission, and many advanced biblical courses are offered in the original tongues; modern languages have a less direct but immensely educative role and are required at the graduate studies level.

It is the understanding gained in these fields rather than the total of credits or semester hours which is significant.

In many seminaries students who have been well prepared in religion and equipped with the tools of theological study will be set free, not to complete their theological course more quickly, but rather to pursue more advanced studies. The principle constantly to be kept in mind is not that of satisfying paper regulations and minimum requirements, but of making the most of opportunities for education.

Professional Combination Courses

The provision whereby a senior may elect the work of the first year in a professional school of the University shall apply solely to eligible students in Trinity College or The Woman's College. The privilege of completing a combined course for the degree is conditioned upon admission to the professional school at the close of the junior year. A student thus admitted registers as a senior in college and as a first-year student in the professional school.

Forestry. Preprofessional training in forestry is offered to men and women who are planning careers in professional forestry. A student who has completed a three-year program of studies in liberal arts and sciences and who has maintained a satisfactory academic record may, with the approval of the dean of his college and the School of Forestry, transfer to the School of Forestry. Upon the satisfactory completion of the forestry courses ordinarily required in the first year in the School of Forestry (see *Bulletin of the School of Forestry*), the student will be eligible for the degree of Bachelor of Science from Duke University.

The professional degree of Master of Forestry may be earned upon satisfactory completion of three additional semesters in the School of Forestry.

Students interested in this combined course are encouraged to consult with the Dean of the School of Forestry.

Law. A student with a distinguished academic record who has completed 96 semester hours of undergraduate work, including the uniform course requirements for the degree of Bachelor of Arts and work of the junior year in his major and related fields, may, with the approval of the dean of the college, transfer to Duke University School of Law and be

eligible for the degree of Bachelor of Arts from Duke University upon completion therein of the work of the first year.

However, study in the Law Combination Program is contingent upon admission to the Duke University School of Law which usually requires an undergraduate degree as a prerequisite for admission. Only in unusual occasions of proved academic excellence will the Law School admit a student after the completion of his junior year.

It is understood that this program shall apply solely to eligible undergraduates who have completed three years in residence in Duke University, and that not less than the full first-year's work of the Law School will be acceptable for credit toward the bachelor's degree.

School of Engineering

Bachelor of Science in Engineering

The School of Engineering offers a four-year program leading to the degree of Bachelor of Science in Engineering (B.S.E.), with opportunity for majors in the professional fields of civil, electrical, mechanical, or biomedical engineering, as well as for majors in selected interdisciplinary fields such as ocean engineering, energy conversion, materials, systems and controls, and the like.

For graduation with a bachelor's degree in engineering, a minimum of 32^{*} semester-courses or their equivalent must be completed, including the following:

- a. Four mathematics courses equivalent to Mathematics 31, 32, 73, and 74.
- b. Chemistry 1 and English 1.
- c. Five courses in social science, history, or humanities (including English 1).
- d. Three courses in natural science (including at least one chemistry course and one physics course)—within the first two years.
- e. A specified number of courses in an approved program of study, representing at least three of the following areas of engineering and applied science: electrical science, materials science and mechanics, and thermal science.

^{*}*Reserve Officers Training Programs.* A maximum of two courses of junior or senior level air science or naval science course work may be counted in satisfying the minimum requirements of 32 courses for a baccalaureate degree in engineering. These two courses may not be substituted for any of the above requirements in English, social sciences, history, or humanities. All other courses in air science or naval science are supplementary to the minimum program.

Program of Studies for the Degree of Bachelor of Science in Engineering

Freshman Year

First Semester Courses		Second Semester Courses	
Chem. 1—Gen. Inorg. Chemistry.	1	Chem. 2—Gen. Inorg. Chem or	
Engl. 1—Freshman Composi-		Phys. 51—Gen. Physics*	1
tion	1	Math. 32—Introd. Math Anal	1
Math. 31—Introd. Math Anal	1	Elective*	1
Elective*	1	Elective*	1
P.E.—Physical Education	.....	P.E.—Physical Education	.....
	4†		4†

*Each student is encouraged to plan a program designed for his individual needs. His faculty adviser will assist him.

†The normal load each semester is four courses (or an equivalent combination of courses, half-courses, and double courses). Freshman engineering students taking air science or naval science may need to schedule a course in military science as a supplement to the normal load.

Sophomore Year

Sophomore year under revision. See 1970 *Bulletin of School of Engineering*.

Junior Year

Junior year under revision. See 1970 *Bulletin of School of Engineering*.

Senior Year

Senior year under revision. See 1970 *Bulletin of School of Engineering*.

Interdisciplinary Program

This program parallels the majors in civil, electrical, mechanical, and biomedical engineering and, subject to faculty approval, is offered in areas such as ocean engineering, energy conversion, materials, and systems and controls.

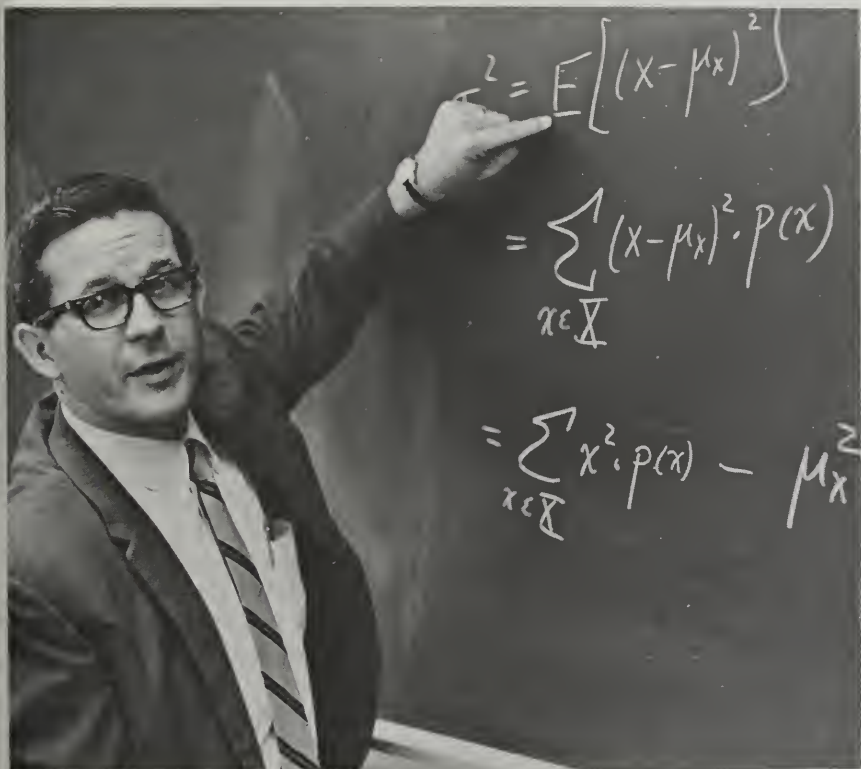
The following requirements govern the interdisciplinary major:

1. The program shall meet the requirements of the Bachelor of Science in Engineering degree as outlined on the preceding pages. Limitation shall be placed on the amount of work which can be taken in a given department during the third and fourth years so that the advantages of interdisciplinary studies may be realized.
2. Each student enrolled in an approved interdisciplinary program shall be assigned to an appropriate engineering department or division for administrative purposes.

Preparation for Graduate Schools

Many graduate schools require special tests for students seeking admission. Information regarding the test requirements should be obtained from the catalogues of the schools to which the student plans to apply. The University Counseling Center has available applications for required graduate and professional testing programs.

Graduate School. The student who plans to enter a graduate school for advanced study should consult an adviser in the field of the proposed advanced study concerning suitable preparation. Most graduate schools have definite requirements. As soon as practicable, the student should ascertain the requirements of the particular graduate school he desires to enter.



Special and Cooperative Programs

Reserve Officers Training Corps

Through the Naval and Air Force Reserve Officers Training programs the University is cooperating with the Department of Defense in providing well-educated officers for the regular and reserve forces of the nation.

The Naval Reserve Officers Training Corps

There are two basic programs through which students can qualify for Naval commissions upon graduation; one, the Regular Naval Reserve Officers Training Corps program, which provides a maximum of four years in the University largely at government expense, followed by a commission in the regular Navy or Marine Corps; the other, the Contract program, which leads to a commission in the Naval Reserve or the U. S. Marine Corps Reserve.

The Regular Student. Quotas are awarded on the basis of an annual nationwide test and selection procedure. Students selected are enlisted in the U.S. Naval Reserve, appointed Midshipmen, USNR, and receive four years tuition, fees, and textbooks at government expense. In addition they receive subsistence pay and summer active duty pay which amounts to approximately \$750 per year. The regular midshipman may

take any major at Duke leading to a baccalaureate or higher degree with certain exceptions, e.g., law, premedicine and medicine, religion, pre-theological and theological study, music, and art. He participates in two summer training cruises aboard ship and receives aviation and amphibious indoctrination at naval shore stations for one summer.

Upon graduation he receives a commission as Ensign in the Regular Navy, or Second Lieutenant in the Regular Marine Corps, after which he serves with the Navy or Marine Corps, as required by the Secretary of the Navy in the same manner as his officer contemporaries who are graduates of the U.S. Naval Academy. The minimum period of active duty is four years for regular officers.

The Contract Student. The contract student is selected from those regularly enrolled freshmen in Duke University who desire to qualify for a commission in the Naval or Marine Corps Reserve while pursuing normal courses of study. Since he normally will be ordered to three years active duty immediately upon graduation and commissioning, the Navy does not recommend that a medical, dental, or theological student apply for this program. He has the status of a civilian who has entered into a mutual contract with the Navy and is not eligible for the benefits and pay received by regular midshipmen. He enlists in a component of the U.S. Naval Reserve and receives subsistence pay of \$50 a month during his last two academic years. In addition he receives active duty pay during the two required summer cruises, normally taken after his sophomore and junior years (only one cruise is required of the class of 1971 and earlier classes).

Both Regular and Contract Students. No distinction is made between the two in the NROTC Unit. Contract students may compete each year for the Regular Program. If selected, they will be appointed to Regular status with the attendant benefits and pay. Both regular and contract students are deferred from Selective Service by virtue of their commitment to serve on active duty after graduation; both are provided necessary uniforms, equipment, and naval science textbooks; both are furnished the same naval science instruction and uniforms, and both are required to wear uniforms on drill days and other special occasions prescribed by the professor of naval science. Upon completion of their undergraduate work, both may apply for continuing studies leading to a graduate degree in certain science and engineering fields. Selection for graduate work is competitive and the number selected is based on the needs of the Navy. If they desire, both regular and contract students may elect the Marine Corps option at the beginning of their junior year, thus qualifying for a commission in the Marine Corps. Both may participate in a Navy sponsored Flight Instruction Program leading to qualification for a private pilot's license, if successfully completed.

Academic Requirements for a Commission. Regular and contract

NROTC students in the Class of 1971 and earlier are required to complete academic requirements as set forth in their contract with the Navy and as outlined in the 1968 edition of this *Bulletin*. They are encouraged to elect courses under the revised requirements listed below.

The academic program for an approved degree and a commission for regular and contract students in the Class of 1972 and later must include all Naval Science courses offered and the following:

For NROTC students majoring in engineering, physics, chemistry, mathematics, or education with teaching majors in mathematics or physical sciences: one year of calculus, one year of physics or chemistry, and Mathematics 51—to be completed by the end of the junior year. History 99 and Political Science 121 to be completed prior to graduation.

For NROTC students majoring in arts, humanities, business, political science, economics and non-physical science or non-mathematics teaching majors in education: one year of calculus (preferred), or one year of statistics and probability; one year of physics or chemistry (preferred), or one year of biological/earth sciences; and Mathematics 51—to be completed by the end of the junior year. History 99 and Political Science 121 to be completed prior to graduation. Marine option students in their junior and senior years will take two relevant courses, as approved by the professor of naval science, that will be taught by the civilian faculty.

The Air Force Reserve Officers Training Corps

This unit functions as a regular department of instruction known as the Department of Air Force Aerospace Studies. It selects, trains, and commissions college men who desire to serve in the U.S. Air Force.

For enrollment in the General Military Course (freshman and sophomore years) the student must be accepted by the institution as a regularly enrolled student; must successfully complete such general survey and screening tests as may be prescribed; and must sign a loyalty certificate with the U.S. Government. Students initially entering the University who have had previous preparatory or high school military training are normally accepted in the General Military Course at the same academic level as that in which they are accepted by the University. The student may elect to attend a six weeks Field Training Course conducted at selected air force bases instead of enrolling in the General Military Course. If he chooses this option he will report to the Field Training Unit during the summer between his sophomore and junior years. To be eligible for continuation, or initial enrollment, in the Professional Officer Course (junior and senior years), a person must:

1. be a citizen of the United States;
2. be selected for advanced training under Air Force procedures;

3. enlist in the United States Air Force Reserve;
4. contract, with the consent of his parent or guardian if he is a minor, to complete the program of advanced training;
5. agree in writing to accept a commission in the U.S. Air Force, and to serve in the Air Force for the prescribed period;
6. complete successfully:
 - a. the General Military Course; or
 - b. six weeks of summer Field Training; or
 - c. have had prior honorable service in the Armed Forces of the United States. Students who qualify for the Professional Officer Course by successfully completing the General Military Course must attend four weeks of Field Training between their junior and senior years. Students must also agree to take orientation flights when offered; must be less than 26 years of age at the time of graduation; and must successfully complete such general survey and screening tests as may be prescribed and must be selected by the professor of aerospace studies and the appropriate authority of the University.

Beginning in the second semester of their freshman year, cadets are eligible to compete for a AFROTC College Scholarship. This scholarship includes tuition, books, laboratory fees, and \$50.00 a month subsistence. The scholarship is awarded on a merit basis and considers academic achievement, leadership potential, and over-all performance. The scholarship can become effective in the sophomore year.

All students in the Professional Officer Course receive \$50.00 per month subsistence and are deferred from Selective Service. All uniforms, books, and training items needed for participation in the AFROTC program are supplied by the corps after receiving a \$20.00 deposit. This deposit is refunded to the student whenever he terminates his corps status.

A thirty-five hour Flight Instruction Program using light aircraft is restricted to seniors who may, upon completion of the course, qualify for a Civilian Private Pilot's License. To participate in this program, fourth year cadets must be physically and aptitudinally qualified for the Air Force Flight Instruction Program.

Upon graduation and completion of the Professional Officer Course, selected students for flying or line assignment will be offered commissions as Second Lieutenants in the Air Force Reserve. Reserve Officers who desire lifetime careers in the Regular Air Force may apply for regular appointments after serving on active duty for one year. Cadets who maintain a high academic and aptitudinal average are eligible for designation as Distinguished AFROTC Cadets and later Distinguished AFROTC Graduates.

Advanced Placement Program

The colleges have arranged for course placement on the basis of good performance on either the Advanced Placement Examinations of the CEEB or—to a more limited extent—on placement tests given by the colleges during orientation and upon certain achievement tests offered by CEEB. The College Board Advanced Placement Examinations are a vehicle to courses on the sophomore level or higher in botany, chemistry, English, French, German, history, Latin, mathematics, physics, Spanish, and zoology, whereas the Duke tests are used to decide such placement only in foreign languages, biological science, and mathematics. A further distinction is that only the AP Examinations may lead to credit toward graduation for the course or courses omitted and waiver of *uniform course requirements*. The departmental directors of undergraduate study and the University Registrar are charged with the responsibility for evaluations leading to advanced placement of freshman matriculants.

Advanced Placement Examinations are given in May by the College Entrance Examination Board. Information regarding the tests may be obtained from the Board.

Study Abroad

Duke students may study abroad in programs organized by the University, in approved programs sponsored by other American colleges or universities or through approved arrangements which they make directly with foreign universities. In certain cases scholarship aid may be applied to study abroad.

A leave of absence from the University is arranged for students who qualify. When possible, arrangements are made for students to pre-register while abroad for the semester in which they plan to return.

A student contemplating study abroad should be guided by the following provisions established by the Undergraduate Faculty Council and administered by the Committee on Study Abroad.

The student should:

1. Have a scholastic average of at least *B—*;
2. Obtain provisional approval to study abroad from his academic dean and the director of undergraduate studies in his major department;
3. Receive certification, when applicable, from the foreign language department concerned that he can handle adequately the language of the country where he will study; and
4. Obtain, before matriculation, final approval of his program of

studies from his academic dean and the director of undergraduate studies in his major department.

If the student wishes to transfer credit to Duke, his plan of study must be approved by the Committee on Study Abroad through his academic dean. Ordinarily work to be considered for transfer must be done in the language in which courses are normally given in the institutions attended.

Semester and Academic Year Programs

Duke offers three programs for a semester abroad. Grades earned in these programs are recorded on the official transcript.

The Vanderbilt in France Program, Aix-en-Provence, France. Courses are given during both fall and spring in French language, art, philosophy, and literature. Completion of French 64, or equivalent, is required prior to departure.

The Vanderbilt in Spain Program, Madrid, Spain. Work is given in Spanish language, literature, art, music, and history for either the fall or spring. Completion of Spanish 64, or equivalent, is required prior to departure.

Intercollegiate Center for Classical Studies. As one of the participating members in the Intercollegiate Center for Classical Studies in Rome, Duke University may nominate majors in classical studies for admission to a semester's work at the center, usually in the junior year. Instruction is offered in Greek, Latin, ancient history, and ancient art and archaeology. Students in the program do not withdraw from Duke in the usual sense; grades transfer as earned. Some scholarship help is available. Students should consult Professors Richardson or Stanley for additional information.

In addition to these three programs Duke students may study in semester or academic year programs sponsored by other American colleges and universities. In recent years Duke students have received transfer credit for work done in Paris, Lyon, Freiburg, Munich, Athens, Jerusalem, Florence, Madrid, Geneva, and other university centers.

Other students have received transfer credit for approved work arranged independently at foreign universities, for example, Exeter College, University of Nottingham, the Free University of Berlin, St. Andrews University, University of Edinburgh, and others.

Summer Study Abroad

Duke University has sponsored summer programs abroad in France, Germany, and Italy. Students are selected competitively and have an opportunity to earn credit and grades for two courses.

Information regarding study abroad may be obtained from the

academic deans. In all cases they must be informed in advance concerning participation in study abroad.

Intercollegiate Athletic Program

The program, controlled entirely by the University, consists of the organization and training of representative freshman and varsity teams in football and basketball and varsity teams in baseball, cross country, fencing, golf, lacrosse, soccer, swimming, tennis, track, and wrestling.

The program is under the supervision of the Athletic Council, composed of seven members. Three of the seven are appointed by the President of the University from the faculty in the following manner: one member from the Officers of General Administration, one from the Officers of Educational Administration, Division of the Colleges, and one from the Officers of Instruction of the undergraduate colleges. From this group the President of the University appoints the faculty chairman, who serves as chairman of the Athletic Council and of its executive committee.

Four of the seven members are selected from the alumni. One of the four is a University trustee appointed not less frequently than every three years by the chairman of the Board of Trustees. The remaining three, who may not succeed themselves, are elected annually by the general Alumni Association for terms of three years. The Director of Alumni Affairs serves *ex officio* as secretary of the Council and of the executive committee.

The three faculty members of the Athletic Council constitute a committee which has the responsibility of enforcing the scholarship and athletic requirements of the University for participation in intercollegiate sports. The athletic eligibility rules are those of the Atlantic Coast Conference.

The executive committee of the Athletic Council is composed of the faculty chairman of the Council, one other faculty member of the Council and one alumni member of the Council. The executive committee of the Council recommends to the President of the University persons to serve as Director of Athletics and as coaches in the various sports. The election of such persons, however, rests solely with the Board of Trustees of the University or with its Executive Committee on recommendation of the President of the University. The Director of Athletics recommends to the Athletic Council athletic schedules and the award of insignia of merit earned by members of the athletic teams. These decisions are the responsibility of the Athletic Council subject to approval of the President.

Each of the four undergraduate classes selects annually, for a term of one year, a member of each respective class to serve in an advisory capacity to the Athletic Council on the matter of awarding insignia of merit.

All funds from athletic events are handled entirely by the Treasurer of the University. An audit of the receipts and disbursements of these funds is made annually by the official auditors of the University and a report thereof made annually to the Executive Committee of the Board of Trustees.



Resources for Study

Faculty

Numbering over 900, the faculty maintains a tradition of personal attention to students. Many members of the faculty are or have been national leaders in their various professional organizations, as well as consultants to industry, government, or foundations, and their contributions to scholarship include innumerable publications in all areas of research. To honor outstanding faculty members, the University has established thirty-three James B. Duke professorships, and there are seventeen other named professorships as well.

University Libraries

To support a rich educational experience in a world of rapid and far-reaching change, great library collections are essential. Undergraduate students at Duke are fortunate to have available exceptional resources. The University library, among the first seventeen university libraries in the country, contains 2,030,000 volumes and 4,000,000 manuscripts. In 1968-69, 90,000 volumes were added. About 10,000 periodicals and 170 foreign and domestic newspapers are regularly received. Separate departmental and professional school libraries provide notable collections in the several disciplines.

A division of photographic services, with the most modern cameras and other equipment for microfilming and photographing printed and manuscript materials, provides a battery of reading machines to serve the Library's large collection of microfilms of rare books, periodicals, and newspapers.

A new research library building, adjoining the present building on the West Campus and providing more than twice the space earlier available for books and students, was occupied in the spring of 1969. The entire complex was named on Founder's Day in 1966 the William R. Perkins Library, in honor of a close associate of Mr. James Buchanan Duke.

The Woman's College Library, with its own attractive Georgian building, contains 178,000 volumes in an open stack collection, chiefly those books most frequently used in the undergraduate curriculum. The School of Engineering also maintains its own library which contains 45,000 volumes and 480 periodicals.

More detailed information may be obtained in a *Student's Guide to the General Library*, available upon request to the Librarian of the University.

Laboratories

In addition to the laboratories in the various science departments (Botany, Chemistry, Geology, Physics, Psychology, and Zoology), there are specialized facilities at the Duke University Marine Laboratory in Beaufort, North Carolina; at Highlands Biological Laboratory in Highlands, North Carolina; in the Duke Forest at Durham, North Carolina; and in the Sarah P. Duke Gardens on the West Campus of Duke University.



Admission

New students are admitted to the undergraduate colleges in September of each year.

The size of the entering classes is approximately as follows: Trinity College, 675; The Woman's College, 375; School of Engineering, 135; and School of Nursing, 80. Since enrollment is limited, the Committee on Admissions selects those students who in its judgment are best qualified to benefit from the opportunities which the colleges offer. Selection is based not only upon grades and tests scores but also upon recommendations of school officials and other personal criteria.

Requirements

Although there are no inflexible subject matter requirements, at least fifteen acceptable units of secondary school credit must be presented. Of these at least twelve must be in college preparatory subjects: English, foreign language, history and social studies, mathematics, and physical or biological sciences. Applicants for the School of Engineering are advised to present four units of mathematics and at least one unit in physics or chemistry.

Students applying for admission are required to take the Scholastic Aptitude Test, the English Composition Test, and two other achievement tests of their own choosing given by the College Entrance Examination Board. It is recommended that an applicant who has had two or more years of a foreign language in secondary school take the achievement test in that language.

Although candidates for the School of Engineering need not submit an achievement test in a language, they must include the appropriate mathematics achievement test.

Prospective students are urged to broaden their reading outside of class during their senior year and to make the acquaintance of books and magazines that do not form part of the subject matter of their courses. At the same time, they should take every opportunity to increase their competence in writing. Those who cannot write simple, clear, grammatical English prose will be at a serious disadvantage in the competition for admission and also in the general work of the freshman year.

Early Decision Plan

For the well-qualified student who has definitely decided to enter Duke if accepted, the University offers to reserve a place by Early Decision on December 1 of the student's senior year in secondary school. The deadline date for completing applications for Early Decision is November 1; therefore, prospective Early Decision candidates should make arrangements to take the Scholastic Aptitude Test and three Achievement tests, including English composition, on or before the July testing date preceding their senior year.

Regular Admission

Candidates for regular admission must apply no later than February 1, and normally do so during the fall of the senior year. For this group, decisions are mailed by April 15.

Application forms and instructions will be sent, upon request, by the Office of Admissions, Duke University, Durham, North Carolina 27706. A non-refundable processing fee of \$15.00 must accompany the application form.

The University does not require interviews for admission. However, a candidate who wishes to arrange an interview should do so through the Director of Undergraduate Admissions.

Admission to Advanced Standing

Admission by transfer from other institutions may be arranged for a number of students entering the rising sophomore or junior class of Duke University. All such candidates must submit, in addition to the normal application materials, official transcripts of all work completed at other accredited colleges, employment record when candidates have been employed for an extended period since graduation from secondary school, and scores on the Scholastic Aptitude Test of the College Entrance Examination Board. Courses on which a grade less than C has been earned cannot be accepted for transfer credit.

A small number of special students of mature age may be admitted for such courses of instruction as their earlier training and experience may qualify them to take. They may not be accepted as candidates for a degree, however, unless they are able to meet all normal requirements for admission.

Readmission of Former Students

A student who desires to return, following withdrawal from college, should apply to the Director of Undergraduate Admissions. He will be asked to send a detailed statement of his activities since withdrawal. If practicable, the student should arrange for an interview with the appropriate dean of his college.



Financial Information

Tuition, Fees, and Other Expenses

The prospective student who seeks the optimum opportunity in higher education will not be a bargain hunter. Certainly, some sound plan for paying the cost of college must be devised, but this plan should be formulated after the thoughtful selection of an institution has been made. No college or university can honestly say that an education at the college level is inexpensive. Most university people and the ever-growing college alumni families across the country, however, will reflect the feeling that the benefits derived from a college education constitute a handsome return on the dollars invested.

Each student going to college should analyze carefully his financial situation. In making such analysis it should be recognized that the primary responsibility for defraying the cost of an education lies with the student and his family. The typical college student can depend upon some contribution from his family's current income, a proportionate share of family savings, and anticipated income from summer employment. The number of years of study contemplated and the number of dependent children in the family should be considered in computing the funds which will be available in a particular year.

Fees paid by the students cover only a part of the cost of their instruction and the operations of the University. Income from endowment

and contributions from the alumni and other public-spirited men and women meet the balance, which constitutes more than half the total cost.

Estimated Expenses for an Academic Year. Certain basic expenditures are to be considered in preparing a student's budget such as tuition, room, and board. These necessary expenditures together with a reasonable amount allotted for miscellaneous items such as books and supplies are shown below:

	<i>Men</i>	<i>Women</i>
Tuition	\$2,100.00	\$2,100.00
Room Rent (Double Room)	335.00	360.00
Board	*650.00	†550.00
Books and Supplies	150.00	150.00

*Cafeteria estimate.

†Board rate.

It should be realized that additional expenses will be incurred which will depend to a large extent upon the tastes and habits of the individual. It is realistic to suggest that the average Duke student, however, can plan on a budget of \$3,700.00 for the academic year. Travel costs, clothing purchases, and other major expenditures would have to be added to this estimate.

Debts. No records are released and no student is considered by the faculty as a candidate for graduation until he has settled with the Bursar for all indebtedness.

Bills may be sent to parents or guardians provided the Bursar has been requested in writing to do so. Failure to pay bills on or before the due dates will debar the student from class attendance until the account is settled in full.

Tuition. Tuition of \$1,050.00 is due and payable not later than the day of registration for a particular semester. After the day of registration refund of the tuition, on a pro-rata basis, will be made only in the event the student involuntarily withdraws to enter the armed services or dies during the course of the semester.

Registration Fees and Deposit. New students, on notification of acceptance, are required to pay a non-refundable first registration fee of \$20.00 and to make a deposit of \$50.00. The deposit will not be refunded to accepted applicants who fail to matriculate. For those who do matriculate, \$25.00 of the deposit serves as a continuing room deposit for successive semesters, and the remaining \$25.00 serves as a continuing registration deposit. Arrangements for refund of the \$25.00 room deposit are described in information furnished each resident student by the Housing Bureau.

Readmission. Students who have been readmitted to the University

after an absence of one or more semesters, on notification of readmission, are required to make the \$50.00 room and registration deposit.

Late Registration. Students who register in either semester at a date later than that prescribed in the Calendar of the colleges must pay to the Bursar a fee of \$10.00.

Refunds. The \$25.00 preregistration deposit will be refunded to students (1) who the University does not permit to return, (2) who graduate, or (3) who request the refund at the time of preregistration, thus indicating their intention not to return for the following semester. The preregistration deposit will not be refunded to students who preregister and fail to enter the following semester on schedule.

ROTC Deposit. An Air Force ROTC deposit of \$20.00 is required of students enrolling in Air Science to cover possible loss of military equipment issued to them. This deposit is refunded to the student upon return of issued equipment.

Special Students. In the regular academic year students who register for no more than two courses in a semester are classified as special students. Special students will be charged at the following rates: One course, \$210.00; half-course, \$105.00; quarter-course, \$52.50; one course plus laboratory or precept, \$280.00. Registration for more than two courses requires payment of full tuition.

Auditors. Auditing of one or more courses without charge is allowed students paying full fees, provided that the consent of the instructor is obtained. Students who are enrolled for not less than one nor more than two courses may audit other courses by payment of \$35.00 for each course audited. With the consent of the appropriate instructor and the Registrar, alumni may audit undergraduate courses for \$35.00 for each course.

Duke Employees. Certain full-time employees with two or more years of service with the University may request permission to take up to two courses during any one semester. Permission may be granted based on the individual merits and circumstances of each application. Employees receiving permission to take such courses will be charged one-half of the tuition rate for special students as shown above. A course may not be audited unless another course is taken for credit.

Fees for Transcripts. Requests for transcripts should be directed to the Office of the Registrar. Ten days should be allowed for processing. A minimum fee of \$1.00, payable in advance, is charged for a single copy. A charge of \$.50 will be made for each additional copy on the same order.

Fees for Course Changes. Changes in courses for reasons not arising within the University require a payment of \$1.00 for each change made. No course may be elected later than one week after the opening of the semester, and no student may be admitted to any class without an official enrollment.

Living Expenses

Housing. In the residence houses for undergraduate men, the rental charge for a single room is \$445.00 for the academic year or \$222.50 for each semester; for a double room the charge is \$335.00 for each occupant, or \$167.50 per semester for each occupant. Rental rates in the air-conditioned dormitories are \$500.00 for a single room for the academic year, or \$250.00 for each semester; for a double room the charge is \$375.00 for each occupant, or \$187.50 per semester for each occupant. Information concerning the student's obligations under the housing contract is published in the *Bulletin of Information and Regulations*.

In the residential units of The Woman's College the rental charge for a single room is \$480.00 for the academic year, or \$240.00 for each semester. The rental charge for a double room is \$360.00 for each occupant, or \$180.00 per semester for each occupant. A section of The Graduate Center, West Campus, is reserved for Woman's College students. Detailed information concerning the student's obligations under the housing contract is published in *The Woman's College Handbook*.

Food Services. The dining facilities on the West Campus include two cafeterias, with multiple-choice menus, and the Oak Room where full meals and *a la carte* items are served. The cost for the academic year will approximate \$650.00 but would vary from this amount depending upon the taste of the individual.

The dining halls in which all resident women have their meals are located in The Woman's College Union and in Gilbert-Addoms residence hall. The charge for board is \$275.00 per semester, payable at the time of registration. If a student withdraws during the first six weeks of the semester, a board refund is made on a pro rata basis; if withdrawal occurs after that time, no refund is allowed, except in the case of death.

Student Aid

It is the aim of the Financial Aid Program to provide, insofar as possible, financial assistance required by students who are unable to defray the cost of college from their own resources. This assistance is made available in the form of scholarships, grants-in-aid, loans, and part-time employment.

In 1969-70 financial aid totaled approximately \$1,688,000.00. Of this amount \$1,367,400.00 was allotted to 1,416 undergraduate students in the form of scholarships, grants-in-aid, and remissions of tuition; \$320,450.00 in student loans. In addition students earned approximately \$490,000.00 through part-time employment on the campus and in the city of Durham and the surrounding area.

Freshman students shared proportionately in this aid: 424 received

awards totaling \$550,800.00 in direct assistance not including loans or part-time employment. Loans were made to 178 freshmen totaling \$105,700.00 in addition to other assistance received from Duke University.

All requests for application materials for scholarships and other forms of financial assistance should be addressed to the Office of Undergraduate Admissions, Duke University, Durham, North Carolina 27706.

A student in residence who is receiving financial assistance based upon need may not, without special permission for appropriate reason, register an automobile on campus during the academic year for which the aid is granted.

Scholarships

All candidates for scholarships and grants-in-aid must submit the official Application for Admission and the Application for Scholarship and Financial Aid to the Office of Undergraduate Admissions. Scholarship candidates who desire to be considered for the maximum value of scholarships on the basis of financial need are required to submit the Parents' Confidential Statement of the College Scholarship Service, forms for which may be obtained from any high school guidance office or from the Admissions Office.

Scholarship candidates should initiate their applications during the fall semester of their senior year in secondary school. Instructions concerning the specific requirements and deadline dates will accompany the application materials.

Awards annually available to undergraduate students at Duke University fall into several major categories as follows:

Angier B. Duke Memorial Scholarships. Recipients of these awards are students whose superior records mark them as young men and young women who give outstanding promise of becoming leaders in their chosen fields of endeavor. Candidates for admission to the freshman classes in Trinity College, The Woman's College, the School of Engineering, and the School of Nursing are eligible to apply.

Number available: Usually forty for each freshman class.

Value: \$500.00 to \$3,400.00 annually.

W. N. Reynolds Memorial Scholarships. Recipients of these awards are students of outstanding ability who have made superior records and show promise of constructive leadership. In considering candidates for the awards, first consideration will be given to:

1. Children of employees of R. J. Reynolds Tobacco Company or any of its affiliates or subsidiaries.
2. Children of families residing in Forsyth County, North Carolina.
3. Other candidates who are residents or natives of North Carolina.

Number available: Four for each freshman class.

Value: \$500.00 to \$3,400.00 annually.

The Mary Duke Biddle Scholarship in Music Composition. This scholarship at a fixed stipend of \$2500 per year is available to a member of each entering class. It is renewable from year to year so long as the student does satisfactory work. The student wishing to apply for this award will proceed in the normal manner but will be required to submit examples of his music composition. Eligibility is limited to students planning to major in music.

Huguenot Scholarship. A scholarship of \$1,000.00 per year is available from the Huguenot Society of America to a descendant of a Huguenot ancestor.

Christian Vocations Scholarships. Students preparing to enter full-time religious work are eligible to apply for special consideration on the basis of need. These students will be required to submit the Parents' Confidential Statement. Students with need will be recommended by the Director of Undergraduate Financial Aid to the Christian Vocations Scholarship Committee which will consider the vocational commitment of the applicant. Students approved by the Christian Vocations Scholarship Committee are required to sign a note each semester for the amount of financial assistance granted. These notes will be cancelled upon evidence that the student has entered full time Christian work after graduation.

United Methodist Scholarships. A number of United Methodist Scholarships, valued at \$500.00 per year, are available on a basis of demonstrated need to Methodist students who have given evidence of leadership in their local Methodist Youth Fellowship Groups.

Corporation Scholarships. Certain scholarships financed by private corporations are available annually to undergraduate students at Duke University. The selection of the recipients of these awards is made by the University Scholarship Committee. These scholarships are assigned to students whose records of scholarship and leadership are outstanding and whose financial need can be demonstrated.

Value: \$200.00 to \$2,000.00 annually.

Scholarships for Foreign Students. A limited number of awards will be made each year to qualified students from other countries who enter either as freshmen or as students with advanced standing. Candidates for these awards are required to submit the Application for Scholarship and Financial Aid and the Parents' Confidential Statement of the College Scholarship Service provided by the Admissions Office of Duke University.

AFROTC College Scholarship Program. Beginning in the second semester of their freshman year, cadets are eligible to compete for a AFROTC College Scholarship. This scholarship includes tuition, books,

laboratory fees, and \$50.00 a month subsistence. The scholarship is awarded on a merit basis and considers academic achievement, leadership potential, and over-all performance. The scholarship can become effective in the sophomore year.

Grants-in-Aid

Recipients of these awards are able students who need financial assistance in order to meet the cost of attending college.

Value: From \$100.00 to \$2,500.00 annually.

Remissions of Tuition

Children of ministers in the North Carolina and Western North Carolina Conferences of the United Methodist Church who are residents in the Conference and children of ministers of all faiths residing in Durham County are eligible to receive a remission of the tuition charge for a maximum of eight semesters of undergraduate study at Duke University.

Loans

Loan funds held in trust by the University as well as funds supplied by the federal government through the National Defense Education Act of 1958 are available to qualified students. Repayment of loans under the National Defense Education Act of 1958 normally begins nine months after the student graduates or leaves college with complete repayment scheduled within a ten-year period. Interest accrues at the rate of 3 percent commencing nine months after the borrower ceases to be a full-time student at an institution of higher education. Special benefits to those teaching in public or private nonprofit elementary and secondary schools and in institutions of higher education permit a portion of the loan to be cancelled depending upon the length of teaching service.

Loan applications must be submitted not later than the July 1 preceding the academic year for which assistance is requested.

Employment Opportunities

The Financial Aid Office maintains an employment service for students who need part-time jobs. There are many opportunities both on the campus and in the city of Durham. A considerable number of students each year help defray their college expenses by working.

Those students accepted for admission to Trinity College and the School of Engineering in need of part-time employment should apply to the Financial Aid Office, Duke University, Durham, North Carolina. Students in The Woman's College, upperclassmen, and second-semester freshmen who need and qualify for part-time campus employment should

apply to the Assistant Dean of Undergraduate Women, 111 East Duke Building, Duke University, Durham, North Carolina 27708.

Prizes and Awards

The achievements of undergraduate students are recognized in various fields of college activity. The following prizes suggest the range of the recognition:

The Debate Council. This council authorizes the awarding of medals to members of the graduating class who have represented the University in at least two intercollegiate debates. The medals are given by the local chapter of the Tau Kappa Alpha Fraternity.

The Robert E. Lee Prize. The gift of the late Reverend A. W. Plyler, of the class of 1892, and Mrs. Plyler. The sum of \$50 is awarded annually at Commencement, preferably to that member of the senior class of Trinity College or the College of Engineering who, in character and conduct, in scholarship, and athletic achievement, in manly virtues and capacity for leadership, has most nearly realized the standards of the ideal student.

Medal of the North Carolina Association of Certified Public Accountants. The North Carolina Association of Certified Public Accountants annually awards a medal to the senior who, in the judgment of his instructors, is the most outstanding student in accounting in his graduating class.

Julia Dale Prize in Mathematics. This is an annual cash prize of at least \$50. The winner is selected by the Department of Mathematics on the basis of excellence in mathematics. In some years first and second prizes are given.

The Henry Schuman Music Prize. This prize of \$100 is awarded annually to an undergraduate of Duke University for an original composition of chamber music or a distinguished paper in music history or analysis. The award is sponsored by The Woman's College and the Department of Music of Duke University through a continuing gift from Dr. and Mrs. James H. Semans who named the prize after Mr. Henry Schuman, a life-long friend of the Semans and Trent families, a talented amateur violinist, and one who helped to build valued collections in the Duke Library.

The Phi Lambda Upsilon Prize. Phi Lambda Upsilon, honorary chemical society, yearly awards a suitable prize to an outstanding junior who is majoring in chemistry. The recipient's name is inscribed on a plaque displayed in the Chemistry Library.

The Chemistry Department Award. This prize is awarded in the spring of each year for scholarship in chemistry, physics, and mathematics. The prize consists of a one-year junior membership in the American Chemical Society and a one-year subscription to either the *Journal of the American*

Chemical Society or Industrial and Engineering Chemistry. To qualify for this prize, the student must (1) be enrolled as an undergraduate of Duke University and (2) be taking or have taken a fourth-year chemistry course. The selection is based on the grade average for all courses taken in chemistry, physics, and mathematics. In case of a tie equal awards are given.

The James B. Rast Memorial Award in Comparative Anatomy. This award is given annually by the parents of James Brailsford Rast in memory of their son, a member of the class of 1958 at Duke University. The award, consisting of the *Atlas of Descriptive Human Anatomy* by Sobotta and bearing the James B. Rast Memorial bookplate, is given to the student who demonstrates the greatest achievement in the study of comparative anatomy.

The Anne Flexner Memorial Award in Creative Writing. This award has been established by the family and friends of Anne Flexner, who graduated from Duke in 1945. It consists of \$50.00 in cash and a number of books chosen by the student. The award is given annually for the best piece of creative writing submitted by a Duke undergraduate. The competition is limited to short stories (5,000 word limit), one-act plays (5,000 word limit), poems (100 line limit), and informal essays (3,000 word limit). Only one manuscript may be submitted by a candidate, and it must be delivered to the English Office, Room 325 Allen Building, before April 15.

The William Senhauser Prize. This prize is given by the mother of William Senhauser in memory of her son, a member of the Class of 1942, who lost his life in the Pacific Theatre of War on August 4, 1944. The award is made annually to the sophomore or junior in Trinity College or the School of Engineering who has made the greatest contribution through participation and leadership in intramural sports. The winner of this prize is chosen by a committee selected by the President of the University.

The Friends of Duke University Library. This group offers three prizes in an annual contest open to all undergraduate students for the best book collections acquired during their college year. The contest is supervised by the Undergraduate Committee of the Friends of the Library, which announces each fall the terms of the award. Inquiries may be directed to the Curator of Rare Books. Collections entered in the contest are exhibited each spring in the Perkins Library. The prizes are awarded on the basis of the student's collection, a personal interview to determine the over-all planning and objectives of his collecting activity, and his familiarity with his own books and the general field of his collecting interest.

The William T. Laprade Prize in History. This prize is offered in honor of William T. Laprade, who was a member of the History Department at Trinity College and Duke University from 1909 to 1953, and Chairman of the Department from 1938 to 1952. It is awarded to that

senior who is graduating with distinction and whose senior essay in history has been judged unusually meritorious.

The Donald E. Spofford Medal. This medal is presented to the most outstanding member of the Men's Student Government Association.

The Horace F. Inman Award. This award is made to the fraternity, freshman, and independent dormitory which throughout the year demonstrates the best qualities in citizenship.

The James A. Oliver Memorial Award. This award was established in 1963 by the family of James A. Oliver with the cooperation of Delta Mu Tau, Duke student music honorary fraternity, and is given to the student or students who have done the most to further the interest of music at Duke University. A prize of up to \$350.00 is awarded annually.

The Tau Beta Pi Prize. This prize is awarded each year by North Carolina Gamma Chapter of Tau Beta Pi, engineering national honor society, to a sophomore student in engineering for outstanding scholastic achievement during the freshman year.

The Walter J. Seeley Scholastic Award. This award is presented annually by the Engineers' Student Government to that member of the graduating class of the School who has achieved the highest scholastic average in all subjects, and who has shown diligence in pursuit of an engineering education. The award was initiated to honor the spirit of academic excellence and professional diligence demonstrated by Dean Emeritus Walter J. Seeley. The council hopes that this award will serve as a symbol of the man and the ideals for which he stands. The name of the recipient is inscribed on a plaque displayed in the Engineering Building.

The Hamilton Watch Award. This award is presented by the Hamilton Watch Company to the senior in engineering who has most successfully combined proficiency in his major field of study with notable achievements in social sciences and humanities. The award is a Hamilton electric watch, appropriately engraved, accompanied by a letter of commendation to the recipient.

The American Society of Civil Engineers Prize. This prize is awarded annually by the North Carolina Chapter of the American Society of Civil Engineers to two outstanding seniors in civil engineering, upon recommendation of the faculty of the Civil Engineering Department. The basis for selection is the student's scholastic record, his contribution to the student chapter, and his participation in other college activities and organizations. The prize consists of a Certificate of Award and the payment of one year's dues in the American Society of Civil Engineers.

The American Public Works Association Prize. This prize is awarded annually by the North Carolina section to an outstanding senior in civil engineering upon the recommendation of the faculty of the Civil Engineering Department. The basis for selection is the student's scholastic record and his interest in a career in public works. The prize consists of a

Certificate of Award, one year's payment of dues in the American Public Works Association, and a \$25 cash award.

The George Sherrerd III Memorial Award in Electrical Engineering. This award is presented annually to that senior student in electrical engineering who, in the opinion of the electrical engineering faculty, has attained the highest level of scholastic achievement in all subjects and simultaneously has rendered significant service to the School of Engineering and the University at large. The award was established in 1958 by the parents of George Sherrerd, III, a graduate of the Class of 1955, to recognize outstanding undergraduate scholarship. The recipient receives a monetary award and his name is inscribed on a plaque displayed in the Engineering Building.

The Charles Ernest Seager Memorial Award. This award recognizes outstanding achievement in the annual Student Prize Paper Contest of the Duke branch of the Institute of Electrical and Electronics Engineers. The award, established in 1958 by the widow and friends of Charles Ernest Seager, a graduate of the Class of 1955, consists of inscribing the name of the contest winner on a plaque displayed in the Engineering Building.

The Milmoze Prize. This prize is awarded annually to the student from North or South Carolina graduating in the Department of Electrical Engineering who, in the opinion of the faculty of that department and, as shown by his grades, has made the most progress in electrical engineering during his last year in School. The prize consists of a Certificate of Award and one year's payment of dues in the Institute of Electrical and Electronics Engineers for the membership year in which the honoree is awarded his baccalaureate degree.

The American Society of Mechanical Engineers Award. This award is presented annually to a senior in mechanical engineering for his outstanding efforts and accomplishments in behalf of the American Society of Mechanical Engineers Student Section at Duke. The award consists of a Certificate of Recognition.

The T. C. Heyward Award. This award is given annually to the outstanding Mechanical Engineering sophomore by Pi Tau Sigma. The award will normally consist of a handbook as well as a small cash award.

The Machinery Magazine Award. This award is presented annually by The Industrial Press, publisher of the magazine, to the outstanding student in machine design in the graduating class. The award consists of a copy of the latest edition of *Machinery's Handbook*.

Academic Information and Regulations

Registration

Preregistration

All new undergraduate students preregister by mail during the summer preceding matriculation for their first college semester. An *Academic Guide* and preliminary registration materials are sent to all entering freshmen in June. By becoming familiar with these materials the student can plan an academic program. To accomplish preregistration, course cards sent to each student are filled out and returned to the office of the dean of the appropriate college. It is understood, of course, that entering freshmen may change some course selections after they have received counsel during Freshman Week.

Continuing students are expected to preregister at specified times for each successive semester. Prior to preregistration each student receives by mail special instructions and registration materials. He prepares a trial course program and presents it at an appointed time to his adviser or to a faculty member designated to assist him in reviewing it. This card is then presented at registration.

Any student who contemplates teaching in elementary or secondary schools should consult an appropriate member of the Department of Education prior to each preregistration period to ensure that he is meeting requirements for certification (many states have unique requirements) and that he will have a place reserved in the student teaching program.

Those who preregister at a time later than the day specified in the University calendar are subject to a \$10.00 fine. Students who fail to preregister are automatically withdrawn and must apply for readmission if they wish to return; they also forfeit their \$25.00 registration deposit unless they indicate at the time of preregistration their intention not to continue in the University the following semester.

Semester Opening and Registration

Preregistered students are expected to report to their college office each semester by 6 p.m. on Registration Day. Failure to report entails a loss of the registration deposit (\$25.00) and registration in courses. An official enrollment is required for admission to any class.

Changes in the schedule for which a student is preregistered can be made on Registration Day or during the first week of classes. Course changes initiated by the student entail a fee of \$1.00 per change.

Course Changes After Classes Begin

During the week following Registration Day, courses may be dropped and added provided certain procedures are followed. To drop or add a course during this period, a student obtains an appropriate card from his dean's office and submits the card, signed by the dean, to the Central Records Office. A course is not officially dropped or added until the Central Records Office receives the appropriate card signed by the dean.

After the first week of classes, courses may not be added; nor may courses be dropped without penalty except for special reasons approved by the dean. A student may drop a course without penalty in the early weeks of the semester if he is clearly carrying a course overload. For freshmen this period extends to the time when six-weeks' grades are assigned; for upperclassmen it extends to November 1 in the fall semester and March 1 in the spring semester. Factors such as poor health or necessary outside work are also taken into consideration in assessing permissible withdrawal from courses without penalty. A *W* is entered opposite the course on the permanent record in lieu of a grade in all cases where withdrawal without penalty is approved. After the above dates, withdrawal will ordinarily incur a penalty *F*. A course discontinued at any time without approval will be assigned an *F*.

Course Information and Regulations

Course Load and Eligibility for Courses

The normal course load each semester is four semester-courses. To take more than five semester-courses in any semester, a student must have the approval of his academic dean.

No student may take more than six courses in any semester; nor may he take fewer than four courses without permission of his academic dean.

Ordinarily, a senior may not elect for credit toward graduation any courses open primarily to freshmen. Juniors may elect only one such course. The Graduate School rules provide that juniors may enroll in a 200-level course if they have earned an over-all *B* average and have obtained the written consent of the instructor, as well as that of the director of graduate studies in the department concerned.

Course Audit

With the written consent of the instructor, a full-time, degree student is allowed to audit one or more courses in addition to the normal program. With the consent of the instructor and the registrar, alumni may audit undergraduate courses at the usual auditing fee. After the first week of classes in any semester, no student classified as an auditor in a particular course may take the course for credit, and no student taking a course for credit may change classification to an auditor. A student may not repeat for credit any course he has previously audited. Auditors submit no daily work, take no examinations, and receive no credit for courses.

Waiver of Physical Education Requirement

A student who has completed a full calendar year or more of active duty in the military forces of the United States may be excused from one semester requirement in physical education for each six months of such active duty.

Special Curricular Opportunities

Reading-Out Introductory Courses

Students of demonstrated academic ability may be granted the option of "reading-out" of an introductory or prerequisite course in order to allow them to advance at their own pace to upper-level work. No course credit may be earned by "reading-out." This opportunity provides for a

richer program for the student who has few places in his curriculum for electives. Any student interested in reading during the summer to bypass an introductory or prerequisite course must be recommended by his dean and secure the permission of the department concerned. Reading for a course and auditing are mutually exclusive procedures. A proposed program of reading should be approved by the director of undergraduate studies in the department in which the work will be done. On passing a qualifying examination prepared by the department a student may be certified for advanced course work in the area. On completion of an advanced course, an entry will be made on his permanent record that he has passed a qualifying examination but no course credit is awarded. Interested students should request further information from their respective dean's offices.

Independent Study

Independent study enables a student to pursue individual research and reading in a field of special interest subject to the supervision of a member of the faculty. A student, with approval of his adviser, the instructor, and the director of undergraduate studies of the instructor's department, may enroll in independent study for any semester of the student's enrollment at Duke.

Graduation With Distinction

Programs featuring independent study and other honors opportunities are available under the title *Graduation with Distinction* in the majority of the academic departments. Although the details and requirements of the program vary from department to department, certain general requirements are uniform. Departments participating may invite students at the end of the sophomore or junior year to enter the Graduation with Distinction Program. To be eligible, students must show promise of achieving by the time of graduation at least a *B* average in the major field. After participation in a seminar in the junior or senior year, and/or a directed course of reading, laboratory research, or other independent study, the student must embody the results of his individual research and study in a distinguished piece of writing. The student's achievement, including the paper, is assessed by a departmental committee. If the student has at least a *B* average in the major field, the committee may recommend that the student be Graduated with Distinction in his major field. Interested students should consult the director of undergraduate studies in his department.

Distinguished Professor Seminars

Interdisciplinary one-semester seminars of restricted enrollment offered to upperclassmen will be led by senior members of the faculty, usually

holders of named chairs. Professors and topics are announced under the title *University Courses*. Because of their scope, the seminars lie outside any particular major though a department may, at its discretion, accept one or more of them as related work. Juniors and seniors with approximately a *B* average who meet prerequisites listed for particular seminars may apply for a seminar through an academic dean of their college. Preference is given to juniors and to those not enrolled in a senior honors seminar.

House Courses

House Courses are initiated and organized by students within given residential units. They are generally, but not necessarily, interdisciplinary in nature. Each course must be sponsored by a faculty member and be approved by the department as well as the Committee on Courses of the Undergraduate Faculty Council if students are to earn credit for the course. Ordinarily House Courses are numbered and carry half-course credit. Grades are submitted on a pass-fail basis. Students are invited to speak with the Secretary of the Committee on Courses for further details.

Declaration and Change of Major

A student may declare his major with his academic dean as early as the second semester of the freshman year; he must choose a major well before preregistration in the second semester of the sophomore year. After declaring a major, the student consults a faculty adviser in his major department each semester during an announced preregistration period.

Majors once declared may be changed by consulting the appropriate academic dean and registering the change in his office.

Class Attendance and Excused Absences

Responsibility for class attendance rests with the individual student. He is expected to attend classes regularly and punctually and must accept the consequences of failure to attend. An instructor is privileged to refer to the dean of the appropriate college for suitable action students who in his opinion are causing their work or that of the class to suffer because of absences. When excessive absences result in a student's failure to carry a normal course load, the dean, after a conference with the student, will determine whether the student may continue his enrollment in the college.

Absences from required classes and tests ordinarily are excused only for illness, certified by a proper medical official of the University and for authorized representation of the University in out-of-town events. Offic-

ials in charge of groups representing the University in such events are required to submit names of students to be excused to the appropriate dean's office forty-eight hours before their absences are to begin.

Absences from final examinations are excused by the appropriate academic dean only in very exceptional circumstances, such as illness certified by a medical official of the University or other condition beyond the control of the student. A student who misses a final examination must notify his dean within forty-eight hours after the time of the scheduled examination. Failure to so notify and to present an acceptable reason for his absence from the examination will result in the student's receiving an *F* in the course.

Credits and Advanced Placement Procedures

The unit of credit for academic work undertaken in the colleges is the semester-course, which generally consists of three to four hours of instruction time each week of the semester. Half-courses and double-courses are also recognized.

Seniors who at the beginning of a semester lack no more than three semester-courses for the fulfillment of the requirements for the A.B. or B.S. degree may enroll, with permission of the Dean of the Graduate School, in graduate courses for a maximum total program of five semester-courses.

Transfer Credit

Transfer credit is evaluated from regionally accredited, degree-granting institutions. Courses taken away from Duke in which grades of less than *C* have been earned are not acceptable for transfer credit. Credit for work completed at other institutions will be determined in relation to the curriculum requirements of the college in which the student enrolls at Duke.

Credit for courses in science, mathematics, or foreign language offered for advanced standing in any of the undergraduate colleges by a transfer student from a junior college will be evaluated by the departments concerned.

Students who transfer to Duke may receive credit for a maximum of two years of work at other institutions of approved standing. No credit is given for work completed by correspondence, and credit for no more than two semester-courses is allowed for extension courses.

Course Credit for Advanced Placement Program Work

Any student who has earned a score of 3, 4, or 5 on a CEEB Advanced Placement Program Examination in one of the following subjects and is

approved for placement may be considered for course credit in the appropriate subject: botany, chemistry, English, French, German, history, Latin, mathematics, physics, Spanish, and zoology. For those students presenting scores of 4 or 5, the award of credit in most cases will be granted automatically upon matriculation; for those presenting scores of 3 it will be determined with the approval of the academic department concerned no earlier than at the end of the first semester following completion by the student of an advanced course in that department with a grade of C or better; the advanced course must be taken by the end of the freshman year. Course credit may be granted for one or two semesters in each subject area in which examination is offered in the Advanced Placement Program.

Placement in Advanced Courses

Advanced courses are those above the introductory level. The numbering of such courses, however, varies among the several departments. An undergraduate in The Woman's College or Trinity College should not assume that the advanced courses to which he may be admitted by the procedures noted below necessarily qualify as "advanced courses" of the type required for graduation. See the section on Advanced Work Requirement on page 36.

Demonstrated proficiency on certain tests and record in previous educational experience are the criteria employed to determine a student's qualifications for advanced courses, with acceptable test scores being the basic criterion. Scores on the following tests are used in granting placement in such courses.

CEEB Advanced Placement Program (APP) Examinations. Scores of 3, 4, or 5 on CEEB Advanced Placement Program Examinations are bases for placement in advanced courses in botany, chemistry, English, French, German, history, Latin, mathematics, physics, Spanish, and zoology. A student presenting such a score and desiring to continue in the same subject matter at Duke may request an advanced course for the fall semester. In selecting a course, see the section on Major Requirements of the appropriate department. Freshmen requesting advanced courses in the summer preregistration procedures will be notified of their placement in the late summer by mail or in Freshman Week.

In the case of French, German, Latin, and Spanish, APP scores of 3, 4, or 5 may result in placement in courses at the 100-level; a conference with the director of undergraduate studies or supervisor of freshman instruction in the appropriate department is required before final placement is made. If students in The Woman's College and Trinity College presenting such scores do qualify for such advanced placement, they will also have satisfied the foreign language proficiency requirement for graduation, and will not need to take foreign language at Duke unless

they so desire. Advanced courses at the 100-level or above, however, satisfy distributional requirements in the humanities.

CEEB Achievement Tests. Scores on CEEB Achievement Tests are the basic criteria for placement in foreign languages (except Russian) and in mathematics. In the case of Russian, CEEB test scores have not yet been sufficiently validated to serve as the basic criteria for placement, and must be supplemented by scores on the Duke placement test in Russian. Students who wish to continue in Russian at Duke or satisfy the foreign language proficiency requirement for graduation, therefore, should take the Duke test, whether or not they have taken the CEEB Achievement Test. The following tables will assist students in making reasonable course selections in the subjects indicated.

FRENCH

<i>CEEB Achievement Scores</i>	<i>Course Placement</i>
200-396	French 1*
397-556	French 63
557 plus	French 91

GERMAN

<i>CEEB Achievement Scores</i>	<i>Course Placement</i>
200-365	German 1*
366-571	German 63
572 plus	Third year

SPANISH

<i>CEEB Achievement Scores</i>	<i>Course Placement</i>
200-453	Spanish 1*
454-623	Spanish 63
624 plus	Spanish 91

LATIN

<i>CEEB Achievement Scores</i>	<i>Course Placement</i>
200-529	Latin 1*
530-639	Latin 63
640 plus	Latin 91

MATHEMATICS

<i>CEEB Achievement Scores</i>	<i>Course Placement</i>
430 or below	No Mathematics
431-529	Mathematics 31A
530-800	Mathematics 31
740-800	Math 31X (a theoretical approach to this subject).

*The first year of a language, including Russian, may not be taken for credit by a student who has completed more than two years of that language in secondary school. Some exceptions may be granted in the case of German, with permission of the director of undergraduate studies in that department.

Students in The Woman's College and Trinity College who, on the basis of CEEB Achievement Test scores, qualify for French, German, Latin, or Spanish 91, or higher, will have satisfied the foreign language proficiency requirement for graduation; however, they will not receive credit for courses thus by-passed. The same applies to those who, on the basis of a CEEB Achievement Test score in Russian as validated by an appropriate score on the Duke placement test, qualify for Russian 91 or higher. Students qualifying for courses in mathematics above Mathematics 31 will not be granted credit for courses by-passed unless they also present appropriate scores on APP tests.

Excuse From Required Course in English Composition

Students who present a score of 700 or higher on the CEEB English Composition Achievement Test are excused from the required course in English composition, English 1. They thereby satisfy the English composition proficiency requirement for graduation, but do not receive credit for English 1.

Duke University Placement Tests

Placement tests in foreign languages and mathematics are administered by Duke University. The foreign language tests are offered during Freshman Week and also at the end of each semester for students desiring to demonstrate proficiency at the level required for graduation. Students desiring to take the tests, including those students enrolled in language courses below the 64 level, may do so upon application to the appropriate department and payment of a small fee to cover costs of the testing arrangements.

Mathematics Placement Test. This test establishes whether or not a student is qualified to take the beginning course in mathematics, namely Mathematics 31. Freshmen who believe that they are eligible for placement beyond Mathematics 31 are invited to see the supervisor of freshman instruction in that department early in Freshman Week. Placement beyond Mathematics 31 does not provide credit for that course.

Students who expect to enter economics, business administration or accounting, engineering, premedical or pre dental programs, mathematics, or science are advised to review their secondary school mathematics, particularly algebra (e.g., factoring, fractions, linear equations in one, two, and three unknowns, functions and graphs, exponents and radicals, and elements of quadratic equations) and trigonometry to qualify for Mathematics 31.

Foreign Language Placement Tests. Placement tests are offered in French, German, Latin, Russian, and Spanish. Generally they are of the CEEB type with two distinct parts: a section on reading comprehension and a test of basic grammar. Students may prepare for the first part by extensive practice in rapid reading, with emphasis on general comprehension rather than translation. Preparation for the second part should include a review of basic grammar with particular attention to verb forms.

In the case of students in The Woman's College and Trinity College, the placement test in Russian should be taken in Freshman Week by those students who wish to continue their study of the language at Duke or who wish to satisfy the proficiency requirement for graduation, even though they have previously taken the CEEB Achievement Test. The placement tests in French, German, Latin, and Spanish should be taken in Freshman Week by (1) those who desire to continue in the language but have not taken the CEEB Achievement Test, and (2) those who,

having taken the CEEB Test, wish to challenge the score obtained on that test either for the purpose of qualifying for a higher-level language course or in order to satisfy the proficiency requirement for graduation, or both.

Students in The Woman's College and Trinity College who qualify on Duke placement tests for a foreign language at the 91 level or higher will have satisfied the foreign language proficiency requirement for graduation; however, they will not receive credit for courses thus by-passed. Such students may wish to discuss with the appropriate director of undergraduate studies the possibility of enrollment in a course at the 100-level. Literature courses on the 100-level satisfy distributional requirements in the humanities division.

Science majors pursuing a B.S. degree are required to select a foreign language acceptable to the departments in which they major. For students pursuing an A.B. degree, major departments may recommend particular foreign languages.

Premedical and predoctoral students must satisfy the foreign language requirements of the degree programs they intend to pursue, whether B.S. or A.B.

Grading and Grades Requirement

Final grades on performance in academic work are sent to students and parents, or guardians, after the examinations at the end of each semester. In addition, six-weeks advisory grade reports for freshmen are mailed each semester.

Passing Grades

Passing grades are *A*, exceptional; *B*, superior; *C*, average; and *D*, low pass. A passing grade may be modified by a plus (+) or a minus (-).

Failing Grades

A grade of *F* indicates that the student has failed the course and that in order to receive credit for the course he must reregister for the course and repeat the work in class.

Pass-Fail Option for Elective Courses

With the consent of the instructor, a junior or senior may choose to be graded on a pass-fail basis in one elective non-major course each semester. A student accepted on this basis completes all the work of the course but receives either a pass (*P*) or fail (*U*) grade in lieu of a standard grade. A pass grade may not subsequently be converted to a regular letter grade nor may the course be retaken on a regular credit basis. After the first week of classes in any semester, no student classified as

pass-fail in a particular course may change to regular registration and no student in regular registration may change classification to pass-fail.

Grades When Absent From Final Examination

In all cases in which the student is absent from a final examination, he receives an *X* instead of a final grade. If he does not present an acceptable explanation for his absence to the appropriate dean's office within forty-eight hours after the scheduled time for the examination, the *X* is converted to an *F*. Only the academic dean is authorized to excuse a student from a final examination. If the absence is excused, the student arranges with the dean and the instructor for a make-up examination. An *X* not cleared by the end of the semester following the examination missed is converted to an *F*.

Grades For Incomplete Work

If because of illness or other emergency a student's work in a course is incomplete, he may receive an *I* for the course instead of a final grade. Incomplete courses must be completed before the close of the succeeding semester; otherwise, the *I* is converted into an *F*. Seniors are expected to complete all courses before graduation. In case a student whose work is incomplete is also absent from the final examination, he receives an *X* for the course.

For purposes of satisfying continuation requirements (see pages 66-68), an *I* is counted as a failing grade. If a student desires to satisfy continuation requirements by completing a course in which he has received an *I*, he must complete the course in time for a final grade to be submitted to the Registrar no later than the day preceding Registration Day for the spring semester or for the first term of the summer session. In the case of an *I* received in the spring semester, this requirement applies whether or not the student plans to attend summer school.

Grades Requirement for Graduation

For grade-average requirements for graduation, see page 15 for students in the Class of 1973 and thereafter, and page 23 for students in the Classes of 1971 and 1972.

Continuation Requirements

Trinity College and The Woman's College

A student must achieve a satisfactory record of academic performance each semester to continue his enrollment in his college. A student who

fails three or more courses in the first semester of the freshman year or who fails two or more courses in any subsequent semester must leave his college for at least two semesters. The double summer session may be counted as a semester. The student's return must be approved by the dean of his college. If the student thereafter fails two or more courses in a semester he will be permanently dismissed from the college. In addition, a student may be dismissed temporarily or permanently by the dean of his college for failing to make satisfactory progress toward graduation. Any student excluded from his college under the provisions of this regulation may at his request have his case reviewed by a committee on academic standards of the Undergraduate Faculty Council. The provision in the regulation relating to a student's failure to make satisfactory progress toward graduation refers, for example, to the situation in which his cumulative grade record for two or more semesters is of such poor quality as to create serious doubt about his ability to satisfy graduation requirements within the normal period of eight semesters. In such circumstances, the student may be required to leave his college, either temporarily to remedy the conditions that explain his poor performance, or permanently when such action appears in the best interest of both the student and the University. A student who is twice withdrawn in these circumstances may not be readmitted to the college.

The School of Engineering

A student who has matriculated in the School of Engineering after September 1, 1965, and before September 1, 1969, must achieve at least the following for continuation from the second to the third year, 46 s.h. credit and a q.p.r. of 1.60; from the third to the fourth year, 74 s.h. credit and a q.p.r. of 1.70; and from the fourth to the fifth year (if needed), 102 s.h. credit and a q.p.r. of 1.80.

In addition, he must pass at least nine semester hours each semester. Physical education credits are excluded.

A student in the School of Engineering matriculating after September 1, 1969, is subject to the following regulations relative to continuation in school: if he fails three or more courses in the first semester of the freshman year or fails two or more courses in any subsequent semester, he must withdraw from the University for at least one academic year; if he is subject a second time to withdrawal for failing two or more courses in any semester he will be dismissed permanently from the University; or if his academic dean feels that the student is not making satisfactory progress toward graduation he is subject to dismissal.

Senior Class Privileges. Students completing ninety-six or more semester hours of work including certain specially designated junior courses are eligible for privileges normally accorded seniors.

Requirements for Graduation. For graduation from the School of Engineering, in addition to completion of an approved curriculum, a student matriculating after September 1, 1965, and before September 1, 1969, must meet at least the following minimum requirements: the completion of 132 semester hours; a cumulative q.p.r. of 1.90; and a q.p.r. of 2.0 in all work, as well as in all engineering work, taken after having attained senior standing.

A student matriculating after September 1, 1969, must meet the following minimum requirements for graduation from the School of Engineering, in addition to successful completion of an approved curriculum: he must pass at least 32 semester-courses (or equivalent combination of semester-courses, half-courses, double courses); 22 of the 32 semester-courses must be passed with a grade of C— or better; the 32 semester-courses must be passed successfully within a maximum time period of 10 semesters. For purposes of this requirement, the averages of grades received in two half-courses will be the equivalent of a grade in a semester-course, and the grade in a double course will count as two semester-course grades of the same quality.

Commencement

Degrees are awarded in June at commencement to those who have completed requirements at the end of either regular semester of the academic year. They are awarded at the end of the summer to students who complete the degree requirements in a summer session.

Eligibility for Academic Honors

Dean's List

In recognition of academic achievement, students who earn a *B* average or higher on a semester's work of not less than the normal academic load are placed on the Dean's List.

Class Honors

To be eligible for Class Honors a student must earn, during the year, credit for at least the normal academic load permitted by the college in which he is registered. Students in the freshman, sophomore, and junior classes who earn a *B+* average on all work for the year are eligible for Class Honors.

Graduation Honors

To be eligible for consideration for Graduation Honors a student must have completed a minimum of three years of study at Duke. Students who earn an average of at least a *B+* are recommended for a degree *magna cum laude*. Those who earn an average of *A-* are recommended for a degree *summa cum laude*.

Changes in Status

Withdrawal and Readmission

A student who wishes to withdraw from college must give official notification to his academic dean. Withdrawals at student initiative prior to the Christmas recess in the fall term or prior to April 15 in the spring term are coded as voluntary, and a *W* is entered in lieu of a grade for each course. Voluntary withdrawals after these dates are permitted only in the event of emergencies beyond the control of the student.

Applications for readmission are made to the Undergraduate Admissions Office. Such applications are reviewed by officers of the college to which the student applies. They are reviewed on the basis of several criteria including his academic record at Duke and prospects of completing requirements for graduation; his citizenship record at Duke and evidence of increasing maturity and self-discipline; the degree of success attendant upon the activities in which he has engaged while away from Duke; and, finally, his relative standing among the group of students applying for readmission. Following the evaluation, a recommendation is made by the college officers with regard to readmission. The Admissions Office then notifies the applicant of the action taken.

Applications for readmission must be submitted by December 1 for admission in February, and by August 1 for admission in September. For readmission to The Woman's College in September, however, it is advisable to apply by March 1 since dormitory spaces are normally assigned by April 15.

Leave of Absence

An upperclass student in good standing may apply in writing to his dean to take a leave of absence for one or two semesters. He must apply before the end of the fall semester for a leave of absence during the spring semester, and before August 1 for a leave of absence during the fall semester. If the leave is approved, the student must keep his dean informed of any change of address. Ordinarily, no leaves are approved for residence in the Durham area.

Preregistration materials will be mailed to all students on leave of absence. A student failing to preregister will be withdrawn from the University and will have to apply for readmission.

Transfer Between Duke Colleges

A student in good standing may transfer from one Duke undergraduate school or college to another only upon written application and with the approval of the officers of the undergraduate colleges involved. The review of a student's request to transfer will involve consideration of his general academic standing, citizenship record, and relative standing among the group of students applying for transfer. The college to which transfer is sought will give academic counseling to a student as soon as his intention to apply for transfer is known, although no commitment will be implied in doing so. A request to transfer should first be made to an academic dean in the college in which the student is presently enrolled.

Full-Time and Part-Time Degree Status

A regular student candidate for a degree who wants to change from full-time to part-time status, or from part-time to full-time status, must consult his academic dean. For special reasons approved by the dean, a full-time degree student who is qualified to continue in his college may register in a part-time degree (special) status for no more than two courses.

Resident and Non-Resident Student

Normally all undergraduates, with the exception of those who are married or whose homes are in Durham, live on-campus. However, overcrowded conditions in the residence halls for men have made it necessary to permit a large number of men to live off-campus. Men other than freshmen who wish to live off-campus should register this desire and receive authorization in the Office of the Dean of Men. A limited number of senior women, 21 years of age or over, may live off-campus. Interested students should apply at the Office of the Dean of Women.

If a student in The Woman's College marries while enrolled, a written request for a change to non-resident status must accompany her statement of marriage plans to the dean of women.

A non-resident student in The Woman's College must apply to the Office of Admissions to be considered for resident status. The request must be made prior to March 1 for September residence and prior to December 1 for February residence. With the approval of the Dean of Women, a non-resident student whose grade record for the previous semester and over-all average is C or better is eligible for resident status.

Non-Degree to Degree Status

A non-degree student must apply to the Office of Admissions for change in status to that of a degree candidate.

Study Elsewhere

Concurrent Enrollment

A student enrolled at Duke may not concurrently enroll in any other school or college without special permission of the appropriate academic dean. See, however, the statement below regarding the reciprocal agreement with the Consolidated University of North Carolina and North Carolina Central University at Durham.

Summer School

Summer School approval forms for courses to be taken at institutions other than Duke may be obtained from the offices of the deans. A student wishing to transfer credit for summer work elsewhere at an accredited college should obtain approval of his course selections prior to taking the courses. He should present a summer catalog of the chosen institution to his dean and to the director of undergraduate studies in each discipline in which he proposes to take a summer course and request their approval.

Summer courses may be taken at an accredited junior college only if completed prior to the conclusion of the student's sophomore year at Duke. In general, students may transfer credit for a maximum of four courses each summer, as long as the residence requirement for graduation is met.

Reciprocal Agreement With the Consolidated University of North Carolina and North Carolina Central University

Under a plan of cooperation between the Consolidated University of North Carolina and Duke University, and between North Carolina Central University and Duke University, students regularly enrolled in the Consolidated University and in North Carolina Central University during the regular academic year, and paying full fees to their institution may be admitted to two approved courses per semester at Duke University upon payment of a nominal registration fee of two dollars plus any other special fees required of all students. Under the same arrangements, students at Duke University may be admitted to one approved course per semester at the Consolidated University of North Carolina or North Carolina Central University.

Other Information

Release of Student Records

No confidential information contained in student records (academic or otherwise) is released to non-University persons or to unauthorized persons on the campus without the consent of the student. Consent is evidenced by each student's signing a form which authorizes the release of personal data. The form may provide for the release of information to one or more persons or agencies only, or it may be a blanket release. Blank forms to authorize or revise the permission are available in the offices of the deans.

Identification Cards

Undergraduate students are issued two-part identification cards which they should carry at all times. The cards are the means of identification for library privileges, student health services, athletic events, and other university functions or services open to them as university students. Students will be expected to present their cards on request to any university official or employee.

The cards are not transferable, and fraudulent use may result in loss of student privileges or suspension. A student should report the loss of this card immediately to the office of his or her dean. The cost of a new ID card is \$5.00.

Conduct of Students

Duke University expects and will require of all its students continuing loyal cooperation in developing and maintaining high standards of scholarship and conduct.

The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University as currently in effect or from time to time put into effect by the appropriate authorities of the University.

Any student, in accepting admission, indicates his willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate, for failure to abide by such rules and regulations or for conduct adjudged unsatisfactory or detrimental to the University.

Students should also refer to the *Bulletin of Information and Regulations*, *The School of Engineering*, *Trinity College*, *The Woman's College*.

The Summer Session

The summer session at Duke University makes available to Duke undergraduate students and to undergraduates from other universities and colleges a notable program of instruction in many fields of knowledge, both academic and professional.

Undergraduates in Duke University who desire to accelerate their programs may complete the work for a degree in three years by attending two or more summer sessions.

Undergraduates from other colleges and universities may enjoy the special advantages of summer instruction at Duke and transfer their earned credits to their own institutions.

The Summer Session of 1970 will include two terms: Term I, June 9 to July 15; Term II, July 17 to August 22. By attending both terms of the Summer Session it is possible for a student to earn credit for as many as four semester-courses (which, on a semester-hour basis no longer employed by Duke, is the equivalent of 12 s.h. credit.)

Instruction of interest to undergraduates will be offered in the summer of 1970 in the following departments and schools: Botany; Chemistry; Economics; Business Administration; Education; Nursing; Engineering; English; Forestry; French; Geology; German; Greek; Health and Physical Education; History; Latin and Roman Studies; Mathematics; Philosophy; Physics; Political Science, Psychology; Religion; Salvic Languages and Literatures; Sociology; Spanish; and Zoology.

Distinctive features of Summer Session instruction are provided by the program in marine biology offered at the Duke Marine Laboratory, Beau-



fort, North Carolina, and by various conferences in several of the departments.

While the basic purpose of the Summer Session is to serve the academic and the professional requirements of those who are interested in their own educational advancement, the University recognizes the need of, and provides for, a varied recreation program, both athletic and social.

Undergraduates of Duke University, both men and women, who plan to attend the Summer Session should enroll with the dean of their own college in Duke University. Undergraduates in other universities or colleges who seek transfer credits should apply directly to the Director of the Summer Session, Duke University, Durham, North Carolina.

Courses of Instruction

Note. Courses primarily for freshmen are numbered from 1 to 49; those primarily for sophomores are numbered from 50 to 99; those primarily for juniors and seniors from 100 to 199; those primarily for seniors and graduates from 200 to 299.

Odd-numbered courses are usually offered in the fall semester; even-numbered courses in the spring semester. *For courses which will be offered in 1970-71, consult the Official Schedule of Courses available to enrolled students in the Registrar's Office.*

Double numbers separated by a hyphen indicate that the course is a year-course and must normally be continued throughout the year if credit is received. A student must secure written permission from the instructor in order to receive credit for either semester of a year-course. Double numbers separated by a comma indicate that although the course is a year course, credit may be received for either semester without special permission.

Afro-American Studies

Professors Blackburn, Budd, Kreps; Assistant Professors Gavins, R. Kramer, N. Thomas

An interdisciplinary major, focusing on the multi-dimensional but interrelated experience of the Afro-American people, was approved in the spring of 1969. The program for this major is still developing, and

further courses than those listed below are being planned. Until a director is appointed, the program is being supervised by a Committee on Afro-American Studies, which will assign an adviser for each student.

The major consists of three groups of courses:

A. Core courses required of all majors:

1. History 83, 84: Afro-American History, 1619 to the Present (preferably completed during the sophomore year). Two courses. *Gavins*
2. Afro-American Studies 197, 198: Seminar (tentative topic—"The Dimensions of Racism in America"). Two courses.

B. Electives—a minimum of four from among the following. (For a description of content see the listing for the appropriate department.)

Economics 106: The Economics of Poverty. One course. *Blackburn and Kreps*

Education 169: Contemporary Issues in Education: Minorities and the Schools. One course.

English 26: Afro-American Literature. One course. *Budd*

Political Science 105: The Black American in Politics. One course.

N. *Thomas*

Psychology 170A: Seminar in the Psychology of Black/White Relationships. One course. *R. Kramer*

Sociology 147: The Black in the City. One course.

Sociology 159: The Negro in America. One course.

C. Related work: The Student's adviser will guide the selection on the basis of the student's interests, his strengths and weaknesses, and his probable career after graduation. Courses which stress Africa or which stress methodology rather than content are generally recommended.

Afro-American Studies 191, 192: Independent Study. Directed reading and research.

Art

Professor Heckscher, *Chairman*; Professor Mueller, *Acting Director of Undergraduate Studies*; Professors Hall, Markman, and Patrick; Adjunct Professor Bier; Associate Professors Sunderland and Jenkins; Assistant Professor Pratt; Lecturers Langedijk, Meyvaert, and Stars; Instructor van Dijk; Visiting Instructor Thompson

Aesthetics

121. *The Principles of Art Criticism*. The development of criteria for making sound critical judgments based on analyses of painting, sculpture, architecture, and design. One course. *Patrick*

221D. *History of Aesthetics*. Theories of art and beauty in the Western world from antiquity to the present. Some attention will be given the development of theories of aesthetics in the Far East. One course. *Patrick*

History of Art

51-52. *Introduction to Art History*. Development of architecture, sculpture, painting, and minor arts as material manifestations of Western culture from ancient to modern times, with some reference to primitive, Oriental, and other non-Western cultures. Two courses. *Staff*

51P-52P. *Introduction to Art History*. Same course as 51-52, except preceptorial is added. Two courses. *Staff*

119. *Fine Arts Photography Laboratory*. History and development of photography as documentation and art, use of materials, techniques, laboratory, and studio practice. Open to art majors or by permission of instructor. Half-course. *van Dijk*

131. *Art and Archaeology of the Hellenic World*. Preliminary treatment of archaeological material from the Aegean, the geometric, and orientalizing periods, followed by the architecture, sculpture, and vase paintings of ancient Greece from archaic through Hellenistic times. Not open for credit to students who have taken Classical Studies 141. One course. *Markman*

132. *Roman Art and Archaeology*. The archaeological background for the formation of the Roman style as derived from Etruscan, Greek, and indigenous Italian sources, followed by the architecture, sculpture, and painting from the early Republic to the end of the empire in Italy, and in the provinces. Not open for credit to students who have taken Classical Studies 142. One course. *Markman*

133. *Mediaeval Architecture*. A survey of Christian architecture in the Near East, the Balkans, Russia, and Western Europe from the beginnings of the mediaeval style in the late classical period to its disintegration in the fifteenth century. One course. *Sunderland*

134. *Mediaeval Painting and Sculpture*. A study of painting, including mosaics, manuscripts, stained glass, and sculpture, in Western Europe from the late classical period through the fourteenth century. One course. *Sunderland*

135, 136. *Art of Northern Europe in the Fifteenth & Sixteenth Centuries*. Netherlandish painting from the van Eycks to Brueghel with references to French fifteenth century illumination and painting the first semester; German painting from Witz to Dürer, Grünewald, and Holbein, with additional attention to graphic art and sculpture in the second semester. Two courses. *Mueller*

137, 138. *Italian Renaissance Art*. A consideration of Italian sculpture and painting in the fourteenth, fifteenth, and sixteenth centuries. The

first semester will be devoted to the art of the fourteenth and fifteenth century; the second to that of the sixteenth century. Two courses. *Jenkins*

140. *Seventeenth Century Painting and Sculpture in Europe*. This course traces the evolution of the Baroque style in European painting and sculpture, with some attention being given to related manifestations in the late sixteenth and early eighteenth centuries. Particular emphasis is laid on developments in Flanders, France, Holland, and Spain. One course. *Jenkins*

141. *American Art*. A survey of architecture, sculpture, and painting in America from the time of the first settlers to the present day, including a consideration of the contributions of the English, Dutch, French, and Spanish to the artistic heritage of the United States. One course. *Patrick*

143S. *The History of Prints and Drawings*. An historical and critical study of drawings and prints from the fifteenth century to the present with reference to functions, values, and relationships to other forms such as painting, sculpture, and the book. One course. *Mueller*

144. *Renaissance and Baroque Architecture*. A study of the development of Renaissance architecture in Italy from its beginnings in the fifteenth century in the works of Brunelleschi to its flowering in the seventeenth century Baroque works of Bernini and Borromini, along with a consideration of the spread of Italian Renaissance forms to north Europe in the sixteenth century and its development into a Baroque style in the seventeenth century. One course. *Sunderland*

145S-146S. *The Rise of Contemporary Architecture*. A study of the sources and evolution of the architecture of today, from the eighteenth century conflict between Romantic Historicism and Industrialism to the work of Gropius, LeCorbusier, Wright, and their successors. Seniors graduating at midyear may receive credit for 145, which is otherwise prerequisite to 146. Two courses. *Hall*

147. *Painting and Sculpture in the Eighteenth and Nineteenth Centuries*. An investigation of the development of painting from the final stages of the Baroque in the eighteenth century to the period of the impressionist movement in the last decades of the nineteenth century. One course. *Sunderland*

148. *Modern Painting and Sculpture*. The history of European painting and sculpture from 1863 to the present day. The course investigates the rise of the anti-academic movements of Impressionism and post-Impressionism in the latter half of the nineteenth century; their outgrowth in Cubism, Expressionism, and Surrealism; and the various abstract styles of the twentieth century. Particular emphasis is placed on such artists as Manet, Renoir, Cezanne, van Gogh, Gauguin, Seurat, Matisse, Picasso, Braque, and Klee. One course. *Patrick*

149. *Pre-Columbian Art and Archaeology*. Architecture, sculpture, pot-

tery, and other arts of the indigenous civilizations in Mexico, Central America, and the Andean region of South America before the Spanish conquest. One course. *Markman*

191, 192. *Independent Study*. Directed reading and research. Open only to qualified students in the junior year, by permission of the department. (See page 59) Two courses.

193, 194. *Independent Study*. Directed reading and research. Open only to qualified students in the senior year, by permission of the Department. Two courses.

For Seniors and Graduates

217. *Aegean Art*. A study of the problems of Aegean art as the forerunner of Greek art and in relation to the contemporary civilization of the eastern Mediterranean world. One course. *Markman*

218. *Early Greek Art*. A study of the problems of the origin and development of Greek art in the Geometric period to the end of the Archaic period. One course. *Markman*

233. *Early Mediaeval Architecture*. The development of religious architecture from the time of Constantine to the end of the First Romanesque style in the third quarter of the eleventh century. One course. *Sunderland*

234. *Romanesque Sculpture*. The development of sculpture in Western Europe from the early Christian period through the culmination of Romanesque art in the west portal of Chartres Cathedral. One course. *Sunderland*

239. *Architecture of Britain*. After a summary of recent archaeological activity in the British Isles and a survey of mediaeval buildings the course deals principally with changing architectural problems and their solutions from the advent of the Renaissance onward. Attention is given to the interests of students majoring in history or literature. One course. *Hall*

240. *Architecture of North America*. A study illustrating the transplantation of European architectural customs since the sixteenth century; the time lag in transit and acceptance of later European developments; the gradual assumption of confident independence in design; and the emergence of international leaders in the United States. One course. *Hall*

241. *Latin American Art*. The architecture, painting, sculpture, and other arts. Emphasis on the architecture of the colonial period. One course. *Markman*

243S. *The Art of the Illuminated Manuscript*. Seminar in paleographic and art historical aspects of illuminated manuscripts in the early Middle Ages. One course. *Meyvaert*

251-252. *Research*. A course designed to give instruction in methods

used in the investigations of original problems. It is open to seniors by permission of the Director of Undergraduate Studies. Two courses. *Heckscher*

292. *Research Problems in the Collections of the North Carolina Museum of Art.* A specialized study of selected art works in the collections of the North Carolina Museum of Art. Students will meet once every week in the museum in Raleigh. In completion of the course each student will submit a report on his particular research project. Prerequisite: permission of the Director of Undergraduate Studies. One course. *Bier*

Design

Students other than art majors may receive not more than two courses for credit in studio courses.

53-54. *Beginning Studio.* A studio course offering experiment and practice with formal elements of composition in various media. Particular emphasis will be given to drawing; watercolor, collage, and three-dimensional media will be secondarily considered. Prerequisite: consent of the instructor. Two courses. *Pratt*

55, 56. *Painting.* Studio course designed to give experience in painting media with individual and group criticism, and discussion of important historic or contemporary ideas in painting as related to student work. Prerequisite: Art 53-54 and consent of the instructor. Two courses. *Pratt*

155, 156. *Advanced Drawing and Color.* Prerequisite: Art 53-54. Two courses. *Pratt*

157, 158. *Advanced Painting.* Emphasis is given to the techniques of various painting and design media. Prerequisite: Art 55 and 56. Two courses. *Pratt*

159, 160. *Printmaking.* This course presupposes a knowledge of design and skill in drawing. Practice in wood engraving; block printing; and in copperplate engraving, etching, aquatint, and drypoint. Reference will be made to prints in relation to the design of the book, and historic examples of the art of the print will be analyzed in the study of these techniques. Prerequisite: Art 53-54. Two courses. *Mueller and Thompson*

181, 182. *Individual Project.* Independent work open to highly qualified seniors on recommendation of the instructor and invitation of the department. Two courses.

Departmental Major in Art

Prerequisite: Introduction to Art History. (Art 51-52 or 51P-52P.)

Major Requirements: The student will elect a sequence of courses emphasizing either the *History of Art* or *Design*.

- a. History of Art: Eight courses in Art History exclusive of Art 51-52, and including two areas of concentration;
- b. *Design*: five studio courses.

The department offers work leading to graduation with distinction. See the section on honors in this *Bulletin*.

Studio Fees: A fee of \$20.00 per semester will be required in all studio courses to cover materials used in each course. The fee is payable upon notification from the Bursar's Office at the beginning of each semester.

Asian and African Languages

Chinese

131, 132. *Intensive Elementary Chinese*. Four hours of classroom work, two hours of language drill. Two courses. *Chang*

133, 134. *Intensive Intermediate Chinese*. Four hours of classroom work, two hours of language drill. Two courses. *Chang*

Hindi-Urdu

171, 172. *Modern Indian Literature*. Readings in English of the major writings of the nineteenth and twentieth centuries. First semester: major emphasis on the impact of English and other literatures on Bengali and Hindi writing to the nineteenth and early twentieth centuries. Second semester: recent and current trends. Two courses. *Staff*

181, 182. *Intensive Elementary Hindi-Urdu*. Four hours of classroom work, two hours of language drill. Concentration on the acquisition of conversational ability in Hindi-Urdu, with a grammar and vocabulary basic to both Hindi and Urdu. Introduction to the Devanagari script and the reading of graded texts. Two courses. *Apte*

183, 184. *Intensive Intermediate Hindi-Urdu*. Four hours of classroom work, two hours of language drill. Advanced conversation in Hindi-Urdu reading and composition. Prerequisite: elementary Hindi-Urdu. Two courses. *Baylis*

Hindi 185, 186. *Advanced Hindi Reading and Composition*. An introduction to scholarly and literary Hindi prose, and extensive practice in composition. Prerequisite: Hindi-Urdu 183, 184, or equivalent. Two courses. *Baylis or Staff*

200, 201. *Special Studies in South Asian Languages*. Intensive concentration in advanced Hindi reading and conversation, or specialized, graded work in cognate South Asian languages necessary for the advanced student contemplating field work in South Asia. Prerequisite: consent of instructor. Two courses. *Staff*

These courses are offered as an enrichment program for students interested in the South Asian subcontinent and may be taken as general electives by advanced undergraduate students. No major work is offered in Hindi-Urdu.

Swahili

101, 102. *Elementary Swahili*. Three hours of classroom work, plus language drill. Two courses. *Bell*

Biology

11P-12P. *An Introduction to Biological Diversity*. The adaptation and diversity of plants and animals; their evolution, ecology, structure, function, and significance to man and his environment. Lectures and laboratories. Two courses. *Stone, White, and Staff*

See other courses listed under Botany and Zoology.

Botany

Professor Johnson, *Chairman*; Associate Professor White, *Director of Undergraduate Studies*; Associate Professor Stone and Associate Professor White, *Supervisors of Freshman Instruction*; Professors Anderson, Billings, Hellmers, Kramer, Naylor, and Philpott; Associate Professors Culberson, Searles, Strain, and Wilbur; Assistant Professor Boynton

11-12. *An Introduction to Biological Diversity*. (See Biology 11-12.)

*52. *Plant Identification*. Practice in the identification of local plants and a study of the principles underlying plant classification. Laboratory, lectures, and field trips. One course. *Wilbur*

53. *Introductory Oceanography*. Basic principles of physical, chemical, biological, and geological oceanography. Prerequisite: one year of a laboratory science or concurrent enrollment in a laboratory science. (Also listed as Geology 53.) One course. *Pilkey (Geology) and Searles*

55. *Plant Anatomy*. A comparative study of basic cell types, tissues, and organs of vascular plants. Correlation of anatomical information with pertinent literature, application of anatomy to problems in systematics and evolution, and the interrelationship between structure and function. Prerequisite: one year of biology or permission of instructor. One course. *White*

*101. *Principles of Heredity*. The basic principles of heredity and their

*Not offered in 1970-71.

significance. Lectures, three hours; laboratory, two hours; conference, one hour. Laboratory work includes experimental breeding of the fruit fly. May be taken as a lecture course without laboratory. Prerequisite: one (high-school or college) course in biology, botany, or zoology; high-school algebra or one year of college mathematics recommended. One course. *Staff*

103. *General Bacteriology*. A study of the morphology and fundamental physiological processes of bacteria: their relationship to sanitation, public health, soil fertility, and food preservation. Prerequisite: one year of biology or chemistry or equivalent. One course. *Johnson*

105. *Plant Diversity*. Major groups of the living plants, their evolutionary origins, and phylogenetic relationships. Prerequisite: one year of biology. One course. *Culberson*

151. *Introductory Plant Physiology*. The principal physiological processes of plants, including water relations, mineral nutrition, synthesis and use of foods, and growth phenomena. Prerequisites: Biology 11, 12 or Zoology 11, 12 or equivalent; one year of chemistry. One course. *Hellmers and Kramer*

156. *Plant Ecology*. Principles of the relationships between plants and their environments. Structures and processes of ecosystems. Laboratory, lectures, and field trips. Prerequisites: Biology 11, 12 or Zoology 11, 12 and Botany 52, or equivalent. One course. *Billings and Strain*

160. *The Anthropology of Agriculture*. Origins and distribution of cultivated plants, domesticated animals, and techniques of cultivation. The major agricultural regions of the world. Man-environment relations in contemporary subsistence-oriented agricultural systems, particularly in the humid tropics. One course. *Bowers*

180. *Principles of Genetics*. Structure and properties of genes and chromosomes, and evolution of genetic systems. Prerequisites: introductory courses in biology, chemistry, and mathematics or equivalent. (Also listed as Botany 280, Zoology 180, and Zoology 280.) One course. *Boynton and Gillham* (Zoology)

182. *Principles of Genetics Laboratory*. Genetic theory applied to laboratory experimentation. May only be taken with Botany 180 or by consent of instructor. (Also listed as Zoology 182.) Half-course. *Boynton and Gillham* (Zoology)

191T, 192T, 193T, 194T. *Independent Study*. Directed reading and research. Open only to highly qualified students in the junior and senior years by permission of the department. Credits to be arranged. *Staff*

195S, 196S. *Seminar in Botany*. Credits to be arranged. *Staff*

209. *Lichenology*. Morphology, systematics, and biological and ecological implications of the lichens. Collection and identification of specimens and the use of lichen chemistry in taxonomy. One course. *Culberson*

*210. *Bryology*. Morphological, systematic, and ecological characteristics of mosses and liverworts. One course. *Anderson*

212. *Phycology*. Morphological and ecological characteristics of common freshwater and marine algae and principles of their classification. One course. *Searles*

221. *Mycology*. Field and laboratory study of vegetative and reproductive structures of the fungi and slime molds. Methods of collection, isolation, propagation, and identification of the major orders as represented in local flora. Prerequisite: one year of biological science. One course. *Johnson*

225ST, 226ST. *Special Problems*. Students with adequate training may do special work in the following fields:

1. *Mycology*. *Johnson*
2. *Cytology*. *Anderson and Boynton*
3. *Ecology*. *Billings and Strain*
4. *Genetics*. *Boynton*
5. *Morphology and Anatomy of Vascular Plants*. *Philpott and White*
6. *Bryology*. *Anderson*
7. *Physiology*. *Hellmers, Kramer, and Naylor*
8. *Taxonomy of Vascular Plants*. *Stone and Wilbur*
9. *Bacteriology*. *Johnson*
10. *Lichenology*. *Culberson*
11. *Phycology*. *Searles*

*240. *Evolution*. Analyses of the processes of adaptation and diversification of individuals, populations, and genetic systems. Prerequisites: introductory biology and genetics, or consent of instructors; cytology recommended. One course. *Klopfer (Zoology) and Stone*

243. *Cytology*. The structural and functional organization of cells. Lectures, readings, and conferences. Prerequisite: one year of botany or zoology. (Also listed as Zoology 243.) One course. *Anderson and Nicklas (Zoology)*

250. *Plant Biosystematics*. Basic descriptive and experimental procedures for the study of vascular plant evolution. Prerequisites: Botany 52 and 55 and either Botany 243 or a course in genetics or their equivalents. One course. *Stone and White*

252. *Plant Metabolism*. The physiochemical processes and conditions underlying the physiological processes of plants. Prerequisite: Botany 151 or equivalent; organic chemistry recommended. One course. *Naylor*

254. *Plant Water Relations*. A study of factors affecting the availability of water, its absorption and use in plants, and the effects of water deficits on plant processes. Prerequisite: Botany 151 or equivalent. One course. *Kramer*

*Not offered in 1970-71.

*255. *Plant Systematics*. A study of the historical background of plant taxonomy, modern concepts and systems of classification, nomenclatural problems, and the taxonomy of specialized groups. Prerequisite: Botany 52 or equivalent. One course. *Wilbur*

*257. *Principles of Plant Distribution*. Interpretation of floristic and ecological plant geography. Prerequisite: Botany 156 or equivalent. One course. *Billings*

258. *Physiology of Growth and Development*. Consideration of the internal factors and processes leading to the production of new protoplasm and its differentiation at the cellular, tissue, and organ level in plants. Prerequisite: Botany 151 or equivalent; organic chemistry recommended. One course. *Naylor*

259. *The Environment*. Environmental principles; methods of obtaining and evaluating environmental data for ecological purposes with special attention to instrumentation and microclimate. Prerequisite: Botany 156 or equivalent. One course. *Billings*

265. *Physiological Plant Ecology*. A consideration of the physiological approach to interpreting adaptation in plants. Special but not exclusive attention will be given to terrestrial seed plants. One course. *Strain*

*266. *Analysis and Classification of Vegetation*. A study of the concepts and methods of synecology. Historical aspects will be reviewed, but emphasis will be placed on modern approaches to the analysis and classification of vegetation. One course. *Strain*

Marine Laboratory

Botany S 207, *Marine Microbiology*, and S 220, *Coastal Field Botany*, are offered in alternate years at the Duke University Marine Laboratory, Beaufort, N.C.; Botany S 211, *Marine Phycology*, is offered annually. Consult the *Bulletin of the Marine Laboratory* for further information.

The University Program in Genetics

Genetics courses offered by the Botany Department are an integral part of this interdepartmental program. Refer to the announcement in this *Bulletin* under *Genetics*, the *University Program* for description of the other offerings.

Departmental Major

For the B.A. Degree

Prerequisites: Biology 11-12 or Zoology 11-12 or advanced placement in botany; Chemistry 1-2 or advanced placement in chemistry; one semester of college mathematics or equivalent.

*Not offered in 1970-71.

Major Requirements: A minimum of five courses selected from the following: Botany 52 (Systematics), 55 (Anatomy), 105 (Morphology), 101 (Heredity) or 180 (Genetics), 151 (Physiology), 156 (Ecology). With approval by the Director of Undergraduate Studies, one or more of these courses may be taken in a related department.

Beyond these few basic courses a student's particular program will be tailored to his current interests and future plans.

For the B.S. Degree

Prerequisites: Biology 11-12 or Zoology 11-12 or advanced placement in botany; chemistry through organic chemistry; Mathematics 31, 32, or an equivalent year of college mathematics.

Major requirements: A minimum of five courses selected from the following: Botany 52 (Systematics), 55 (Anatomy), 105 (Morphology), 101 (Heredity) or 180 (Genetics), 151 (Physiology), 156 (Ecology). With approval by the Director of Undergraduate Studies, one or more of these courses may be taken in a related department. One year of college physics or equivalent, a course in statistics, and proficiency in two foreign languages are recommended.

The emphasis in this pre-professional program will depend on the student's particular interests. Specific programs will be arranged on an individual basis.

Interdepartmental Concentration

A student, while majoring in botany, may take course work in two or more science disciplines to such depths that requirements for the conventional major cannot be met. By joint consent of the appropriate departments, major-related interdepartmental programs may be pursued instead.

Chemistry

Professor Bradsher, *Chairman*; Associate Professor Bonk, *Director of Undergraduate Studies*; Professors Brown, Hobbs, Krigbaum, Poirier, Quin, Strobel, and Wilder; Associate Professors Chesnut, Jeffs, McPhail, Smith, Toren, and Wells; Assistant Professors Henkens, Lochmüller, Palmer, and Porter

1, 2. *General Inorganic Chemistry.* Lectures and recitations on the elementary principles of chemistry and on the structure, properties, preparation, and uses of the elements and their compounds. The laboratory work includes qualitative analysis of some of the more common metals. Two lectures, one recitation, and three laboratory hours. Chemistry 1 is

a prerequisite for Chemistry 2. Prerequisite: qualification for Math 31. Two courses. *Bonk and Staff*

1P, 2P. *General Inorganic Chemistry*. Same courses as Chemistry 1, 2 except preceptorials are added.

42. *Advanced General Chemistry*. An honors course paralleling Chemistry 2 on a more theoretical level. Emphasis is given to molecular structure, inorganic chemistry, and solution equilibria. Selection for the course will be based upon a distinguished performance in Chemistry 1 and interest in a B.S. science major. One course. *Strobel and Wilder*

61. *Physical Chemistry of Aqueous Solutions*. An intensive study of chemical equilibria with special attention to the physical chemistry of aqueous solutions, ionic and molecular structure, and elementary thermodynamics. Laboratory experiments illustrate the principles of gravimetric, volumetric, and instrumental analysis. One lecture, one recitation, and six laboratory hours. Prerequisites: Chemistry 1, 2 and Mathematics 31. One course. *Wilder, McPhail, Poirier, and Toren*

61P. *Physical Chemistry of Aqueous Solutions*. Same course as 61 except preceptorial added.

131. *Modern Chemical Analysis*. Quantitative and instrumental techniques in analysis; selected topics in clinical analysis. Theoretical and applied aspects. Prerequisites: Chemistry 160 or 161. One course. *Toren*

132. *Quantitative and Instrumental Analysis*. Practice in advanced quantitative analysis and in the use of chemical instrumentation in analysis. A discussion of the theoretical and applied aspects of chemical and instrumental methods of analysis. Prerequisites: Chemistry 161, 162, the latter half of which may be taken concurrently. One course. *Toren*

151, 152. *Organic Chemistry*. An introduction to the study of the compounds of carbon in which the chemistry of both aliphatic and aromatic compounds is considered. Laboratory experiments are selected to illustrate the more important reactions and preparations of organic compounds. Three lectures and three laboratory hours. Prerequisite: Chemistry 61 or permission of Director of Undergraduate Studies; Chemistry 151 is prerequisite for 152. Two courses. *Bradsher, Brown, Porter, Quin, and Wilder*

155. *Qualitative Organic Analysis*. Systematic identification of organic compounds based upon a study of physical and chemical properties. Infrared, ultraviolet, and NMR spectra are used in elucidation of structure. Two lectures and six laboratory hours per week. Prerequisite: Chemistry 152. One course. *Quin*

160. *Elements of Theoretical Chemistry*. A one semester course in the principles of physical chemistry. Credit is not given for both 160 and 161. Two lectures, one recitation, and three laboratory hours. Prerequisites: Chemistry 61, Physics 51-52, and Mathematics 32. One course. *Henkens and Smith*

161, 162. *Physical Chemistry*. Fundamentals of theoretical chemistry illustrated by selected laboratory experiments. Two lectures, one recitation, and three laboratory hours. Prerequisites: Chemistry 61, Physics 51-52, and Mathematics 63. Two courses. *Hobbs and Krigbaum*

191, 192. *Independent Study*. Supervised reading and research. Open to students by permission of the department. Two courses. *Staff*

195, 196. *Seminar*. Seminars open to junior and senior students in analytical, inorganic, and physical chemistry. Two courses. *Staff*

216. *Nuclear Chemistry*. Elementary theory of nuclear reactions and properties of radioisotopes. Main emphasis on radiochemistry and radiochemical techniques. Two lectures and three laboratory hours. Prerequisites: Physics 51-52 and Chemistry 160 or 161, either of which may be taken concurrently. One course. *Lochmüller*

217. *Inorganic Chemistry*. An advanced study of the bonding, structures, and reactions of inorganic compounds based on modern physical chemical concepts. Three lectures. Prerequisite: Chemistry 162 or the permission of the Director of Undergraduate Studies. One course. *Wells and Palmer*

234. *Chemical Instrumentation*. Principles of instrument design, electronics, and physical optics. Two lectures and three laboratory hours. Prerequisite: Chemistry 132, which may be taken concurrently, or an equivalent course and Chemistry 161-162. One course. *Strobel*

235. *Advanced Analytical Chemistry*. A theoretical and applied treatment of chemical kinetics, electrode processes, multi-stage separations, organic reagents, and functional group chemistry as related to modern analytical techniques. Prerequisite: Chemistry 132 and 162. One course. *Toren*

240. *Chemical Oceanography*. Physicochemical properties of seawater. Laboratory work and field trips. Prerequisites: Physics 51-52, Math 31-32, Chemistry 131 or 132 or 160 or 161, Zoology 215, or permission of instructor. One and one-half courses. *Stefansson*

252. *Advanced Organic Preparations*. A selected group of laboratory experiments on fundamental organic processes, techniques, and theories. One lecture and six hours of laboratory per week. Prerequisite: Chemistry 152. One course. *Brown*

253. *Intermediate Organic Chemistry*. An advanced study of the reactions of organic compounds and the theories of organic chemistry. Three lectures per week. Prerequisite: Chemistry 152 and permission of the Director of Undergraduate Studies. One course. *Quin and Wilder*

254. *Intermediate Organic Chemistry*. Theory of organic chemistry as applied to chemical reactions and synthetic methods. Prerequisite: Chemistry 253. One course. *Wilder, Quin, and Porter*

255. *Structural Analysis by Spectroscopic Methods*. A study of the application of modern spectral methods of structure analysis of organic compounds. Topics will include nuclear magnetic resonance, optical

rotatory dispersion, circular dichroism, and mass spectrometry. Prerequisites: Chemistry 155 and 253. Three lectures per week. One course. *Jeffs and Rosenthal*

263. *Thermodynamics*. Review of classical thermodynamics, including application of chemical potentials to the treatment of equilibria in multi-component systems. Elementary statistical thermodynamics including derivation of appropriate partition functions. Introduction to thermodynamics of irreversible processes. Three lectures per week. Prerequisites: Chemistry 162 and permission of the Director of Undergraduate Studies. One course. *Krigbaum, Hobbs, and Smith*

264. *Biophysical Chemistry*. Application of methods of physical chemistry to biological problems. Three lectures per week. Prerequisites: Chemistry 160 or 161. One course. *Henkens*

267. *Introductory Quantum Mechanics*. The fundamentals of quantum mechanics with elementary applications. Linear algebra; the uncertainty relations; the harmonic oscillator; hydrogen-like systems; angular momentum; perturbation theory; chemical bonding; time-dependent phenomena. Three lectures per week. Prerequisites: Chemistry 162 and permission of the Director of Undergraduate Studies. One course. *Chesnut*

271. *Introduction to Research*. Lectures on the use of chemical literature and on special areas of chemical research. Oral and written reports by the students on topics selected from current chemical literature. Half-course. *Brown*

Departmental Major

For the A.B. Degree

Prerequisites: Chemistry 1 and 2 or Chemistry 1 and 42 or advanced placement; Mathematics 31, 32; Physics 51-52.

Major requirements: Chemistry 61, 131, 151, 152, 160 (or 161), and usually 191-192 or 195-196. If neither independent study (191-192) nor seminar (195-196) is taken in chemistry, one 200-level chemistry course or Chemistry 155 or Chemistry 162 must be taken to complete the major.

For the B.S. Degree

Prerequisites: Chemistry 1 and 2 or 1 and 42 or advanced placement; Mathematics 31, 32, 63; Physics 51-52; German 1-2 or its equivalent.

Major requirements: Chemistry 61, 132, 151, 152, 155, 161, 162, 217 and two courses selected from 191-192 or 195-196.

Recommended: Physics 161; Mathematics 51, 68, or 111.

The language requirement should be fulfilled by completing the second college year (or its equivalent) of German.

Students planning graduate study in chemistry should complete one

college year or its equivalent of a second language usually chosen from Russian or French.

Students interested in graduate study in chemistry should take appropriate additional courses in mathematics and physical sciences (see departmental adviser).

Classical Studies

Professor Newton, *Chairman*; Associate Professor Womble, *Director of Undergraduate Studies*; Professors Richardson, Truesdale, and Willis; Associate Professor Oates; Assistant Professor Stanley; Instructor Burian

Greek

1-2. *Elementary Greek*. A study of grammar and an introduction to reading. Two courses. *Willis*

63-64. *Intermediate Greek*. Introduction to Greek prose and poetry. First semester: Plato's *Apology of Socrates* and two dialogues. Second semester: two plays of Euripides. Two courses. *Truesdale*

97, 98. *Sight Reading in Greek Prose*. Readings from easy Attic prose writers. Open to students who have completed one year of college Greek or the equivalent, with consent of the instructor. Two hours per week throughout the year. Two half-courses. *Truesdale*

103. *Greek Historians*. Selections from Herodotus and Thucydides. One course. *Burian*

104. *Greek Orators*. Selections from Lysias and Demosthenes. One course. *Burian*

*105, 106. *Homer and the Greek Lyric*. First semester, selected books of the *Iliad*; in the second, portion of the *Odyssey* and selections from lyric poets. Two courses. *Stanley*

*107, 108. *Greek Tragedy and Comedy*. Selected plays from Greek tragedy and comedy. Two courses. *Staff*

117. *Greek Prose Composition*. The character of the course is determined by the needs of the students enrolled. Half-course. *Truesdale*

191, 192. *Independent Study*. Directed reading and research. Open only to highly qualified juniors and seniors. Two courses. *Staff*

For Seniors and Graduates

203. *Homer*. The *Iliad* and *Odyssey*; the problems of language and structure in the epic; present state of Homeric scholarship. One course. *Stanley*

*Not offered in 1970-71.

205. *Greek Lyric Poets*. Fragments of the early lyric poets; selected odes of Pindar and Bacchylides. One course. *Truesdale*

*206. *Aeschylus*. The *Oresteia*, with study of the form of *Agamemnon* and its place in the design of the trilogy. One course. *Willis*

*208. *Sophocles*. The Theban plays; the structure and style of Sophoclean tragedy. One course. *Willis*

*209. *Euripides*. Representative tragedies in their political and philosophical context; analysis of dramatic form and texture. One course. *Stanley*

*210. *Aristophanes*. Origin and development of Greek comedy; representative plays of Aristophanes. One course. *Truesdale*

*221. *Early Greek Prose*. Greek prose in the fifth century from the Ionian scientists and logographers to Herodotus; Gorgias, Antiphon, and the Old Oligarch. One course. *Willis*

*222. *Thucydides*. The *History*; Thucydides' historical method and style. One course. *Willis*

223. *Greek Orators I*. Early fourth century rhetoric, including Andocides, Lysias, and Isocrates. One course. *Staff*

224. *Greek Orators II*. Aeschines' *Against Ctesiphon* and Demosthenes' *On the Crown* in the light of fourth century political history and rhetorical development. One course. *Willis*

*225. *Plato*. Selected dialogues and related passages illustrating the development of philosophical topics and stylistic motifs. One course. *Stanley*

*231. *Hellenistic Poetry*. The principal lyric, elegiac, pastoral, and didactic poets of Alexandria; emphasis on Callimachus and Theocritus. One course. *Stanley*

241. *Advanced Prose Composition*. Xenophon, Lysias, and other prose authors as models of style and practice in the writing of Attic prose. Half-course. *Willis*

Latin

1-2. *Elementary Latin*. Study of the structure of the language (inflections, vocabulary, syntax, and pronunciation). Second semester: readings in prose and poetry. Two courses. *Staff*

63. *Intermediate Latin*: Selected prose. One course. *Burian and Womble*

64. *Intermediate Latin: Vergil*. Readings from the *Aeneid*; lectures on the epic and its history and Vergil's style and technique. One course. *Burian and Womble*

91, 92. *Latin Prose and Poetry*. The reading of Latin as literature, with particular emphasis on form and style. First semester: Catullus and the

*Not offered in 1970-71.

Pro Caelio of Cicero. Second semester; the *Odes* of Horace and the historical works of Sallust of Livy. Two courses. *Richardson*

*93. *Roman Comedy*. The plays of Plautus and Terence. One course. *Richardson*

*94. *The Roman Novel*. Petronius' *Satyricon* and Apuleius' *Metamorphoses*. One courses. *Richardson*

95. *Seneca*. One course. *Richardson*

96. *Lucretius*. One course. *Richardson*

*97, 98. *Sight Reading in Classical, Mediaeval, and Renaissance Latin*. Offered especially for students in fields other than classical studies who wish to maintain and refresh their Latin. Two hours per week throughout the year. (Open to students enrolled in other courses in Latin only on the recommendation of their instructors.) Two half-courses. *Staff*

99S, 100S. *Seminar in Latin*. Emphasis on literary criticism and evaluation. For freshmen and sophomores. Two courses. *Staff*

107. *Roman Elegy: Propertius and Tibullus*. One course. *Womble*

108. *Ovid*. One course. *Womble*

*109. *The Roman Historians: Caesar and Sallust*. One course. *Womble*

*110. *The Roman Historians: Livy and Tacitus*. One course. *Womble*

*117. *Latin Prose Composition*. The character of the course is determined by the needs of the students enrolled. Half-course. *Richardson*

191, 192. *Independent Study*. Directed reading and research. Open to highly qualified juniors and seniors. Two courses. *Staff*

For Seniors and Graduates

201. *The Verse Treatise*. The genre of didactic poetry; emphasis on Lucretius' *De Rerum Natura*, Vergil's *Georgics*, and Ovid's *Ars Amatoria*; attention to Cicero's *Aratea*, the *Astronomica* of Manilius, Horace's *Ars Poetica*, and Ovid's *Fasti*. One course. *Richardson*

202. *Roman Satire*. A survey of the genre, with concentration on Horace, Juvenal, and Persius. One course. *Womble*

*203. *Epic: Vergil. The Aeneid*. One course. *Newton*

*204. *Epic: Lucan and Statius*. The development of the Roman epic in the Silver Age. One course. *Richardson*

207. *The Prose Epistle*. The letter as a vehicle of communication and as a literary form. One course. *Richardson*

*208. *The Epistle in Verse*. The verse letter as a literary form; reading in the *Epistles* of Horace, the *Heroides* of Ovid, and Statius. One course. *Womble*

*209. *Fragments of Early Latin*. The remains of Latin poetry of the third and second centuries B.C., from Livius Andronicus to Lucilius, with emphasis on the epic and drama of Ennius. One course. *Stanley*

*Not offered in 1970-71.

210. *Lyric and Occasional Poetry*. Shorter verse forms: epigram, pastoral, song, and panegyric. One course. *Womble*

*211. *Roman Oratory I*. The literary history and criticism of Roman oratory. One course. *Richardson*

*212. *Roman Oratory II*. A continuation of Latin 211. One course. *Staff*

*221. *Medieval Latin I*. Latin literature of late antiquity, from Prudentius to the Carolingian Revival. One course. *Newton*

*222. *Medieval Latin II*. Literature in Latin from Charlemagne to the Renaissance. One course. *Newton*

*241. *Advanced Latin Composition*. Experiments in imitation of the great Latin prose styles and introduction to the composition of verse. Half-course. *Richardson*

Classical Studies

Courses on the 100-level are open to juniors and seniors, and to qualified sophomores by permission of the instructor.

51. *Greek Literature in English Translation*. Reading in translation of the major Greek authors: Homer, *Odyssey*; lyric poets; Aeschylus, *Oresteia*; Herodotus; Sophocles, *Oedipus Tyrannus*, *Antigone*; Euripides, *Medea*, *Hippolytus*, and *Bacchae*; Plato, *Symposium*. One course. *Burian and Truesdale*

52. *Latin Literature in English Translation*. Reading in translation of the major Roman authors: Plautus, Terence, Cicero, Vergil, Horace, Livy, Ovid, Lucan, and Tacitus. One course. *Burian and Richardson*

53. *Greek History*. The political and intellectual history of the Hellenes from earliest times to the death of Alexander the Great. One course. *Oates*

54. *Roman History*. The Roman republic and empire to the Council of Nicaea. One course. *Oates*

55. *Greek Art and Archaeology*. Greek architecture, sculpture, and painting from the Bronze Age to the classical period. Study of objects in the Duke Classical Collection is included. One course. *Stanley*

56. *Roman Art and Archaeology*. Rome's achievement in architecture and decoration, portraiture, and relief sculpture; from the Villanovans to the Antonine emperors. One course. *Stanley*

57S, 58S. *Seminar in Classical Studies*. Aspects of the history, art, and literature of classical Greece and Rome. For freshmen and sophomores. Two courses. *Staff*

*113. *Ancient Historians and Historiography*. Theory and practice of Herodotus, Thucydides, Polybius, Livy, Sallust, Tacitus, and Ammianus Marcellinus. One course.

*Not offered in 1970-71.

114. *Greek Drama*. Reading in English translation of Aeschylus, Sophocles, Euripides, Aristophanes, and Menander. One course. *Truesdale*

*115. *The Classical Tradition*. The notion of the "classical" from the creation of the archetype to the present. One course. *Burian*

*116. *Criticism of the Arts and Letters in Antiquity*. Aesthetic theory and practical criticism among the Greeks and Romans. One course.

117. *Ancient Mythographers*. Myth in classical and mediaeval writers from Hesiod to Boccaccio. One course. *Newton*

*134. *The Athenian Empire*. Imperial democracy at Athens and its consequences for the *polis*. One course. *Staff*

*135. *Alexander the Great*. His career and the effects of his conquests. One course. *Staff*

*136. *The Hellenistic Kingdoms*. The Greek world from the death of Alexander in 323 B.C. to the end of the second century B.C. One course.

*137. *The Roman Revolution*. Rome from the time of the Gracchi (133 B.C.) to the death of Augustus (14 A.D.). One course.

*138. *The Decline and Fall of Rome*. Rome from the death of Commodus to the accession of Constantine. One course.

*143. *The Ancient Cities of Greece*. The *polis* as a physical and societal complex; urban problems and their solutions through the centuries. A different Greek city that has been extensively excavated and well published is chosen as representative of each century and examined in detail. One course. *Richardson*

*144. *Ancient Cities: Rome and Her Colonies*. As a metropolis and a cosmopolis; the sources and uses of significant architectural and urbanistic ideas; the city government and organization of the megalopolis; Roman colonies throughout the Empire. One course. *Richardson*

*195S, 196S. *Junior Seminar in Classical Studies*. The seminar will change each year according to the interest of the instructor. Two courses. *Staff*

For Seniors and Graduates

*231. *Greek Sculpture*. Techniques and styles of the major schools and personalities in archaic, classical, and Hellenistic free-standing and architectural sculpture. One course. *Stanley*

*232. *Greek Painting*. Techniques and style in the various media; emphasis on the problems of chronology, attribution, and iconography of Attic pottery. One course. *Stanley*

*235. *Roman Architecture*. Significant monuments chosen to exemplify the Roman genius in building in the late Republic and early empire. One course. *Richardson*

*236. *Roman Painting*. Roman pictorial art with concentration on the

*Not offered in 1970-71.

wall-painting from Campania. Investigation of techniques, iconography, and the use of pictures in decoration. One course. *Richardson*

*253. *Greece to the Orientalizing Period*. One course. *Oates*

*254. *The Age of the Tyrants and the Persian Wars*. One course. *Oates*

*255. *The Age of Pericles*. One course. *Oates*

*256. *The Fourth Century through Alexander*. One course. *Oates*

*260. *The History of Rome to 146 B.C.* One course.

261. *The Roman Revolution, 146-30 B.C.* One course. *Oates*

*262. *Rome under the Julio-Claudians*. One course. *Staff*

*263. *From the Flavian Dynasty to the Severan*. One course. *Oates*

270. *The Rise of the Hellenistic Kingdoms*. One course. *Oates*

271. *The Hellenistic World, 250-31 B.C.* One course. *Oates*

Departmental Major in Greek

Prerequisite: Greek 1-2 or equivalent.

Major requirements: Six courses in Greek to be selected from 63-64 and courses numbered above 100; at least two courses of work must be taken in courses at the 200-level. Students will be required to pass an examination testing proficiency in Greek prose composition or to complete Greek 117. Majors in Greek normally take at least four courses in Latin, but the nature and amount of this related work may vary with the student.

Departmental Major in Latin

Prerequisite: Latin 91, 92 or equivalent.

Major requirements: Six courses in Latin above the level of Latin 91, 92, which must include three courses at the 200-level. Students will be required to pass an examination testing proficiency in Latin composition or to complete Latin 117.

Related work: Majors in Latin normally take at least four courses in Greek, but the nature and amount of this related work may vary with the student.

Departmental Major in Classical Studies

(Ancient History)

Prerequisite: Classical Studies 53, 54.

Major requirements: Eight courses in ancient history or archaeology above the 100-level, including Classical Studies 195S, 196S and two courses at the 200-level. Reading knowledge of Greek or Latin to the

*Not offered in 1970-71.

level of the undergraduate proficiency requirement in foreign languages. Two advanced language courses (above the level of Classical Studies 91, 92) may be counted as two of the required courses for the major.

Majors in either Greek or Latin who contemplate graduate work are reminded of the necessity for competence in both languages for all higher degrees and of the requirement for a reading knowledge of French and German (usually an examination in one of these languages must be passed in the first year of graduate work and an examination in the other the second year).

Majors in Greek and Latin are eligible for nomination to a term of one semester during their junior year at the Intercollegiate Center for Classical Studies in Rome, of which Duke University is a founding member, at a cost comparable to that of a semester at Duke. Financial arrangements are made through the University, and students may apply for scholarship assistance. Courses in Greek, Latin, ancient history, and archaeology taken at the Center are counted toward the degree requirements of the Department of Classical Studies. For further information, see section on study abroad.

Comparative Literature

The courses in comparative literature may be taken as electives by advanced students; certain courses serve as related work in several departments (see the entries for related work under the separate departments).

No major is now offered in comparative literature. Students interested in the study of the interrelationships of literature as a part of their undergraduate program, or as preparation for graduate work, may consult Dr. Salinger.

191, 192. *Independent Study*. Directed reading and research. Open only to qualified students in the junior year, by permission. See p. 59. Two courses. *Salinger*

193, 194. *Independent Study*. Directed reading and research. Open only to qualified students in the senior year, by permission. See p. 59. Two courses. *Salinger*

201, 202. *Romanticism*. Studies in the origin, rise, and development of the Romantic Movement in the chief literatures of the Western world. The approach is comparative; the principal emphasis will be on England, France, and Germany, with some reference to other countries. Selected subjects will be covered in occasional lectures by speakers from various departments of the University. Two courses. *Salinger*

203, 204. *Realism and Symbolism*. Comparative studies in the literatures of England, France, Germany, Russia, the Scandinavian countries, Spain, and Italy, tracing the decline of romantic individualism and the reappraisal of man's significance against the social background. Selected

subjects will be covered in occasional lectures by speakers from various departments of the University. Two courses. *Salinger*

205. *Foundations of Twentieth-Century European Literature*. The roots of the contemporary scene (Proust, Mann, Rilke, Kafka, Lorca, Lagerkvist, Anouilh, Camus, Hesse) evolving toward a mythology of man. One course. *Salinger*

For a description of the following courses see the departmental listing. *Readings in European Literature*. (English 153, 154.) *Clubbe*

Modern European Drama. (English 155.) *Reardon*

Readings in Scandinavian Literature. (English 159.) *Anderson*

Religious Values in Classical and European Literature. (Religion 187.)

Kort

Recent Literature and its Religious Implications. (Religion 188.) *Kort*

Russian and Polish Romanticism. (Slavic Languages 236.) *Krynski*

Economics

Professor Blackburn, *Chairman* (302 Social Science); Assistant Professor Clark, *Acting Director of Undergraduate Studies* (236 Social Science); Professors Davies, de Vyver, Goodwin, Hanna, Kreps, Naylor, Rottenberg, Saville, Spengler, and Yohe; Visiting Professor Broussalian; Associate Professors Havrilesky, Treml, and Vernon; Visiting Associate Professor Tangri; Assistant Professors Black, Graham, Hartley, and Salkin; Visiting Assistant Professor Boughton

Economics courses aim to develop in the student the critical and analytical skills essential for understanding economic problems and institutions, in both their contemporary and in their historical setting. Although no particular vocational or professional goal is emphasized, these courses provide the academic background necessary for positions in industry, for work in many branches of government service, and for graduate study in economics and the social sciences.

Economics 1 or 51 and 2 or 52 are recommended to all students planning to elect further courses in the department.

Students planning to do graduate work in economics are advised to take as many of the following courses in mathematics as their schedules permit. These courses are listed in preferential order.

Mathematics 31, 32, 51, 73, 74, 131, and 135-136.

1. *Introduction to Economic Problems and Policies*. The present-day American economy and the challenge from centrally planned economies; policies to deal with problems of depression, inflation, growth, and automation. (Open only to freshmen.) One course. *Staff*

1P. *Preceptorial*. Elective preceptorial for students enrolled in Economics 1. *Staff*

2. *The Evolution of Economic Ideas*. A study of man's economic activities and his ideas about them, from the ancient world to the present day. Emphasis is given to the historical roots of important contemporary economic ideologies. (Open only to freshmen.) One course. *Staff*

2P. *Preceptorial*. Elective preceptorial for students enrolled in Economics 2. *Staff*

51. *Principles of Economics*. Examination of the main features of the American economy, measurement of national income, and analysis of forces determining national output and income; fluctuation and growth of output, monetary, and fiscal policies for stability and growth. One course. *Staff*

51P. *Preceptorial*. Elective preceptorial for students enrolled in Economics 51. *Staff*

52. *Principles of Economics*. Examination of forces determining prices and production of goods and distribution of income; problems of agriculture, labor, international trade, economic development, and government in relation to business. One course. *Staff*

52P. *Preceptorial*. Elective preceptorial for students enrolled in Economics 52. *Staff*

106. *The Economics of Poverty*. Poverty in the United States—its definition, measurement, and change over time. Evaluation of present and proposed policies for the amelioration of poverty. Particular emphasis is placed on the racial dimensions of poverty and income distribution. Prerequisite: Economics 52. One course. *Blackburn and Kreps*

109. *Economic Geography of Latin America*. This course involves comprehensive study of the resources and people of Mexico, the West Indies, and Central and South America. Special emphasis is placed upon the possibilities and limitations of increases in trade between the United States and the leading Latin-American countries. One course.

114. *Economic Geography of Africa*. A continental study of the natural environmental factors of Africa and the basic economic patterns of adjustments and adaptations on regional or national bases. One course. *Tuthill*

115. *Fundamentals of Geography*. A functional social studies approach to geographic factors and their interrelationships. One course. *Tuthill*

120. *Economic Geography of Southern Asia*. Concepts of agricultural, manufacturing, and distributive location theory, resource evaluation, and regional planning in Southern Asia. One course

132. *The Economic History of the United States*. Development of economic institutions as the United States passed from a wilderness area to an industrial society. Special attention is given to measures of economic change and their application to models of economic growth and fluctuation. One course. *Saville*

138. *Economic Statistics*. Survey of principal concepts and methods; application to economics. Offered both semesters. One course. *Hanna*

139. *Introduction to Econometrics*. Data collection, estimation, and hypothesis testing. Use of econometric models for analysis and policy. Prerequisites: Math 31 and 32 or equivalent; Economics 138 or Management Sciences 138, or equivalent. One course. *Staff*

149. *Microeconomics*. Cost and supply considerations in price theory, the demand for factors of production. The allocation of resources is examined in the context of competitive and monopolistic market structures. One course. *Clark, Hartley, and Trembl*

150. *Economic Thought Since Adam Smith*. A course of readings in leading economic writers of the nineteenth and twentieth centuries. One course. *Goodwin*

151. *Urban Geography*. Analysis of systems of cities; their location, size, functions, internal organization, growth, and approaches to urban planning. One course.

153. *Money and Banking*. The lender's side of financial markets. The activities of commercial banks and other financial institutions in supplying loanable funds and the effects of these activities on the money supply and its rate of use, the impact of central bank and Treasury operations on financial markets, and the evolution of the present monetary system and its institutions. One course. *Yohe, Clark, and Black*

154. *Aggregative Economics*. Concepts and measurement of national income and expenditures, employment, and price levels; the theoretical determination of these aggregates; and applications of macroeconomic theory to business cycles and economic growth. One course. *Black, Hartley, and Havrilesky*

155. *Labor Problems*. An examination of present-day labor problems followed by an intensive study of methods used by employers and workers in meeting those problems. One course. *de Vyver and Kreps*

189. *Business and Government*. A survey of the public policies which most directly affect the operation of competition in the business world. The course considers the leading philosophies of public control and economic development, the validity of their presuppositions, and their influence on legislation, court decisions, and administrative law. Prerequisite: Economics 149 or consent of instructor. One course. *Havrilesky and Vernon*

191, 192. *Independent Study*. Directed reading and research. Admission will be subject to approval of the individual instructor and the department. Two courses. *Staff*

193, 194. *Independent Study*. Same as Economics 191, 192, but for seniors. Two courses. *Staff*

199. *The Changing South*. (See Interdisciplinary Course 199.)

201, 202. *Senior Seminar in Economics*. Problems in theory and applied economics. Readings, reports, and discussion of selected topics.

For majors in economics, with consent of the department. Two courses. *Staff*

203. *Non-Western Urbanization*. Review of approaches of the various social sciences to the study of urbanization. Research into specific questions and problems of urbanization in non-Western areas. One course.

204. *Advanced Money and Banking*. Monetary theory and its statistical and institutional implementation. Particular attention is given to the development of aggregative theories of prices, interest rates, and production; the functioning of monetary policy within various theoretical frameworks; and appraisal of the recent use in the limitations of Federal Reserve policy. One course. *Yohe*

211. *Introduction to Mathematical Economics*. Applications of topics in calculus, differential equations, and linear algebra to the theory of the firm, capital theory, macroeconomics, cycles, growth, and linear economic models. Prerequisites: Economics 149 and 154; Math 31 and 32 or equivalent. One course. *Staff*

218. *Business Cycles*. The characteristics and measurement of cyclical fluctuations in output, employment, and prices; an historical survey of business cycle theories; modern macroeconomic theory and public policy as they relate to business cycles and associated problems of economic growth; techniques of forecasting cycles. One course. *Yohe*

219. *Economic Problems of Underdeveloped Areas*. Consideration and analysis of the economic and related problems of underdeveloped countries. Some attention will be given to national and international programs designed to accelerate the solution of these problems. One course. *Rottenberg, Saville, and Spengler*

231. *Economic History of Europe*. The economic development of Europe from medieval times to the present. One course.

233. *State and Urban Finance*. Fiscal problems of state and local government. Expenditures, taxation and debt; intergovernmental financial relations. Prerequisite: Economics 51-52 or consent of instructor. One course. *Black and Davies*

234. *Urban Economics*. Economic factors which influence the internal development of metropolitan areas. Urban problems involving slums, ghettos, poverty, and transportation are analyzed from an economic point of view. Prerequisite: Economics 149 or consent of instructor. One course. *Black*

237, 238. *Statistical Methods*. A study of statistical methods appropriate for dealing with problems in business and social science. In addition to developing more thoroughly the subject considered in *Business Statistics*, the following methods will be considered: simple, multiple, partial, and curvilinear correlation; curve fitting; probability; sampling distributions; and statistical inference. Prerequisite: Economics 138 or consent of the instructor. Two courses. *Hanna*

243. *Econometrics I*. Economic theory, mathematics, statistical infer-

ence, and electronic computers applied to analysis of economic phenomena. Objective is to give empirical content to economic theory. Matrix algebra used to develop topics in inference, linear regression, and systems of simultaneous equations. Use is made of the electronic computer. One course. *Hartley and Naylor*

244. *Econometrics II*. A course on the design of computer simulation experiments for economic systems. Topics include generation of stochastic variates, computer models of queueing and inventory systems, models of the firm and industry, models of the economy, simulation languages, and experimental design. One course. *Hartley and Naylor*

257. *Manpower and Human Resources*. Allocation of human resources; returns to investments in education and training; qualitative composition of the labor force. One course. *Kreps*

262. *Trade Unionism and Collective Bargaining*. An intensive survey of the trade union as an economic institution is followed by a study of the principles and problems of union-management relationship as found in collective bargaining. One course. *de Vyver*

265. *International Trade and Finance*. A study of fundamental principles of international economic relations. Subjects covered include the economic basis for international specialization and trade, and the economic gains from trade, the balance of international payments, problems of international finance, investments, and monetary problems. Prerequisite: Economics 149. One course. *Clark*

268. *Competition and Monopoly*. A detailed study of the varieties of imperfectly competitive markets, the economic and legal issues which they raise, and the policy solutions which have been attempted in the United States. One course.

286. *Latin American Economics*. A survey of the problems of economic development in twenty countries. One course.

287. *Public Finance*. An analysis of the impact of governmental expenditures, revenues, and debt on the allocation of resources, the redistribution of income, and the stabilization of income. One course. *Black and Davies*

293. *Soviet Economic History*. Economic policy-making in the USSR in a historical setting. One course. *Trembl*

294. *Soviet Economic System*. Theoretical problems of resource allocation, economic development, and optimal micro-decision-making in a non-market economy. Prerequisite: Economics 293 or permission of instructor. One course. *Trembl*

Departmental Major

Class of 1970

Math 21 or 17; Economics 1 or 51 and 2 or 52; Management Sciences 59 (formerly Management Sciences 57); Economics 138 or Management

Sciences 138 or Math 133; Economics 149; and Economics 154. Any four courses in the department (Management Sciences 143 and Management Sciences 190 may be counted).

Related Work. Six courses in the Departments of Mathematics, Psychology, Political Science, Sociology, History, or Management Sciences. (Math 21 or 17 may be counted.)

Class of 1971

Math 31 (formerly Math 21) or 17; Economics 1 or 51 and 2 or 52; Economics 138 or Management Sciences 138 or Math 133; and Economics 149. Any four courses in the department.

Class of 1972 and all later classes

Math 31; Economics 1 or 51 and 2 or 52; Economics 138 or Management Sciences 60 (formerly Management Sciences 138) or Math 133. Any four courses in the department.

The department offers work leading to graduation with distinction. See the section on Honors.

Education

Professor Cartwright, *Chairman*; Associate Professor Charles B. Johnson, *Director of Undergraduate Studies*; Professors Gehman, Githens, Hopkins, Hurlburt, Petty, Shuman, and Weitz; Associate Professors Ballantyne, Colver, Di Bona, Joseph C. Johnson, Katzenmeyer, Martin, Pittillo, Spaulding, and Sublett; Assistant Professor Carbone; Instructor Lanier; Lecturer Engelhart

Students who expect to teach in the public schools should plan their courses in accordance with the general regulations set forth under Teaching. Students who intend to teach in elementary schools should consult with Professors Petty or Sublett; those intending to teach in secondary schools should consult with Professors Cartwright, Githens, C. B. Johnson, or Shuman. Students should confer with these advisers prior to registration each semester.

Students who do not expect to teach but desire an understanding of the school as part of a liberal education are advised to elect such courses as Education 100 and 113 for their introductory work in the department and then to elect further work in accordance with their special interests.

100. *Social and Philosophical Foundations of Education.* A study of the basic features, assumptions, viewpoints, and issues of education in contemporary America. This course or Education 113 is required of all who intend to practice teach and of all majors in education, and should

be taken in the junior year. One course. *Carbone, Di Bona, C. B. Johnson, Martin, and Sublett*

105. *Elementary Education: Reading.* The process, methods, and materials basic to the teaching of reading in the elementary school. Required in the elementary-education major. Must be taken concurrently with Education 106. Half-course. *J. C. Johnson*

106. *Elementary Education: Language Arts.* The processes, methods, and materials basic to the teaching of the language arts in the elementary school. Required in the elementary-education major. Must be taken concurrently with Education 105. Half-course. *J. C. Johnson*

107. *Elementary Education: Arithmetic.* The processes, methods, and materials basic to the teaching of arithmetic in the elementary schools. Required in the elementary-education major. Half-course. *Petty*

108. *Elementary Education: Science.* The principles, methods, and materials basic to the teaching of the sciences in the elementary school. Required in the elementary-education major. Half-course. *Githens*

113. *History of American Education.* A study of American education from colonial times to the present. The development of schools, their organizations, administration, curriculum, and methods as seen in relation to the social forces that have produced our particular type of civilization. One course. *C. B. Johnson*

118. *Educational Psychology.* A study of the psychology of learning individual and social development, and psychology of adjustment as related to problems of instruction and the processes of education. Prerequisite: Psychology 92 or 93. One course. *Staff*

151. *Public School Music Education.* Required in the elementary-education major. See Music Education 151 for description. Half-course.

152. *Public School Music Literature.* Required in the elementary-education major. (See Music Education 152 for description.) Half-course.

153. *Vocal Music in the Public School.* (See Music Education 153 for description.) One course.

154. *Instrumental Music in the Public School.* (See Music Education 154 for description.) One course.

161. *Integrated Art in the Public School.* Work in the materials and methods in basic two dimensional art media. Required of students majoring in elementary-education and elementary and secondary art education. Half-course. *Stars*

162. *Plastic Art in the Public School.* Work in basic three-dimensional art, giving an understanding of different sculptural media with special emphasis on ceramics. Required of students majoring in elementary-education and elementary and secondary art education. Half-course. *Stars*

195S. *Elementary Education: Principles.* The nature, subject matter, and organization of elementary education for instruction in the primary and intermediate grades. Required in the elementary-education major.

Must be accompanied by Education 196. Half-course. *Petty and Sublett*

196. *Elementary Education: Internship*. Supervised internship in an elementary school. Full-time observation and teaching for half a semester, preceded by Education 195. Prerequisite: 2.0 average over-all and in the elementary major, preparation for teaching in the elementary school and/or consent of the instructor. This course combined with Education 195S will fulfill the seminar and independent study requirement. One and one-half courses. *Petty and Sublett*

201. *Teaching and Supervision of Arithmetic*. Special attention is given to the number system, the fundamental operations (with whole numbers, fractions, and decimals), percentage, and measurements. Considered also are the meaning theory, methods of teaching, problem-solving, evaluation, practice and drill, and selection and gradation of arithmetical contents. Designed for teachers and supervisors in elementary schools. One course. *Petty*

202. *Comparative and International Education: Industrialized Nations*. Structure and functioning of educational institutions in selected developed societies. Relevant social science theory and methods emphasized. One course. *Di Bona*

204. *The School as an Organization*. Processes of exchange between education organizations and their environments; effects on organizations structure, goals, and practices. One course. *Martin*

206. *Studies in the History of Educational Philosophy*. The educational views of leading thinkers in the history of Western philosophy, including Plato, Augustine, Locke, Rousseau, Kant, Whitehead, and Dewey. One course. *Carbone*

207. *Social History of Twentieth-Century American Education*. Twentieth century American education in the context of social and intellectual history. One course. *C. B. Johnson*

215S. *Secondary Education: Principles*. Intensive study of principles, curriculum, and methods in secondary education. Prerequisite: 2.0 average over-all and in teaching field or fields. Must be accompanied by Education 216. Half-course. *Cartwright, Githens, C. B. Johnson, and Shuman*

216. *Secondary Education: Internship*. Supervised internship in junior and senior high school. Full-time observation and teaching for half a semester, preceded by Education 215. Prerequisite: 2.0 average over-all and in the major or teaching field; preparation for a teaching field and/or the consent of the instructor. This course combined with Education 215S will fulfill the seminar and independent study requirement. One and one-half course. *Cartwright, Githens, C. B. Johnson, and Shuman*

217. *The Psychological Principles of Education*. An advanced study of teaching, learning, and the learner. Selected problems guiding the read-

ing of students will be discussed in class. One course. *Gelman and Spaulding*

218. *Comparative and International Education: Developing Societies.* Structures and functioning of educational institutions and processes in developing nations. One course. *Di Bona*

219. *Comparative and International Education: South Asia.* Traditional and modern educational developments in India and Pakistan. One course. *Di Bona*

225. *The Teaching of History and the Social Studies.* Evaluation of the objectives, content, materials, and methods in the teaching of history and the social studies. One course. *Cartwright*

226. *Teaching Reading in the Elementary School.* A study of the nature of the reading process and of principles, methods, and materials for the development of effective reading attitudes and skills as applied both to developmental and remedial programs. Practice is provided with elementary-school children suffering reading retardation, in testing, diagnosis, and daily remedial teaching. One course. *J. C. Johnson*

236. *Teaching Reading in the Secondary Schools.* A study of the nature of the reading process and of principles, methods, and materials for the development of effective reading attitudes and skills as applied both to developmental and remedial programs. For secondary-school teachers of all subjects who wish to improve the reading and study habits of their students. One course. *J. C. Johnson*

237. *The Teaching of Literature in Secondary Schools.* Literature generally taught in secondary schools. Adult and transitional literature are considered. Methods of organizing the program and of teaching literature. One course. *Shuman*

239. *The Teaching of Grammar, Composition, Mechanics, and Usage in Secondary School.* Recent developments in the teaching of grammar, composition, mechanics, and usage. Students will write and grade compositions. Term project. One course. *Shuman*

241. *Principles of Guidance.* An historical survey of the philosophies of guidance; a study of the interrelationships between instruction, administration, and guidance in education. Prerequisite: six hours of psychology or educational psychology. One course. *Colver*

246. *The Teaching of Mathematics.* This course deals with such topics as aims, curriculum, course and lesson planning, and classroom procedure for teaching secondary-school mathematics. One course. *Reynolds*

253. *Law and Education.* The elements and problems of educational organization which have come within the purview of constitutional and legislative provisions and appellate court decisions. One course. *Martin*

255. *Assessment of Abilities.* Selection or construction, use, and interpretation of instruments for predicting and evaluating the outcome of educational experience. One course. *Colver*

258. *Assessment of Personality, Interests, and Attitudes.* The rationale

construction, use, and interpretation of standardized instruments designed for the assessment of students' interests, attitudes, and personality. Emphasis on counseling applications. Prerequisites: Education 243 and 255 or approval of instructor. One course. *Weitz and Colver*

266. *Science in the Elementary School*. Presentation of basic concepts in natural and physical science through selected readings, the use of simple experiments and demonstrations, construction and use of equipment, and field studies. One course. *Githens*

276. *The Teaching of High-School Science*. Discussion, lectures, and collateral reading related to such topics as aims, tests, curriculum, classroom and laboratory procedure, field trips, and course and lesson planning for secondary-school science. One course. *Githens*

Departmental Major

Undergraduate majors in education at Duke University are offered in elementary-school education and science education.

The Department offers work leading to graduation with distinction. See the section on Honors in this *Bulletin*.

Majors in Elementary Education and Science Education

Students desiring to teach in elementary schools or in science in secondary schools should read the descriptions of these programs of study listed under the proper headings elsewhere in this *Bulletin*.

Materials and Methods Courses

Certain courses concerned with materials and methods in teaching the various subjects in the public school curriculum are listed in the proper subject matter department. These courses are intended to give credit for teaching certificates and are recommended by the Department of Education for such credit.

Engineering

For courses in civil, electrical, mechanical, and biomedical engineering, see pages 206-211.

English

Professor Ferguson, *Chairman*; Professor Williams, *Director of Undergraduate Studies*; Professor Patton, *Supervisor of Freshman Instruction*;

Professors Bowman, Budd, Duffey, Gohdes, Lievsay, Nygard, Reiss, Sanders, Smith, Stevenson, and Turner; Associate Professors Anderson, Bevington, Harwell, Jones, Krueger, Mellow, Michalak, Price, Randall, Reardon, Strandberg, and Wetherby; Assistant Professors Butters, Clubbe, Clum, DeNeef, Gerber, Jackson, Monsman, and Schwerman; Lecturers Rottenberg and Vick

Writing and Language

1. *Freshman Composition*. Weekly expository themes based on British and American prose fiction and non-fiction; one general lecture, one section meeting, and one individual conference each week. One course. *Staff*

*65-66. *Imaginative Writing*. A foundation course in imaginative writing, both prose and verse. Primarily for sophomores, but in special cases open to other students. Consent of instructor required. Two courses.

101. *Advanced Expository Writing*. Designed for students interested in expository writing, this is a course in advanced composition. It includes also business letters and reports. Primarily for juniors and seniors; open also to sophomores approved by the instructor. One course. *Harwell*

103, 104. *Creative Writing*. Class discussion of students' manuscripts and individual conferences with the instructor. Open to sophomores, juniors, and seniors. Students desiring admission to either course should present a piece of writing to the instructor as early as possible in the preceding semester. Two courses. *Bevington*

108. *Development of the English Language*. An elementary historical study of the English language: patterns of change and growth, with some attention to methods of philological inquiry and the relations of philology to literary studies. One course. *Bowman*

109. *Modern English Grammar*. A descriptive study of written and spoken American English of the present time, with attention to standards of usage and pronunciation and the relations of grammar to composition. One course. *Butters*

English and American Literature

Introduction to Literature. One course each; English 26 may be taken twice. *Staff*

20. (Not a course. This number represents one course credit for advanced placement.)

21S. *Studies in the Novel*.

22S. *Studies in Drama*.

23S. *Studies in Drama and Poetry*.

24S. *Studies in Poetry*.

*Not offered in 1970-71.

25S. *Studies in Epic.*

26. *Studies in Special Topics.* Some of the sections of this course may be taught as seminars; consult the Schedule of Courses.

55, 56. *Representative British Writers.* Usually, these works are studied in the first semester: Chaucer's Prologue to *The Canterbury Tales* and at least two tales, Shakespeare's *I Henry IV*, *Hamlet* or *King Lear*, and one other play, John Donne's poetry (selections), Milton's *Paradise Lost* (selections) and some of the shorter poems; in the second semester: novels by Fielding (*Joseph Andrews*) and Dickens (*Great Expectations*), and selections from the poetry of Pope, Wordsworth, Keats, and Yeats. Two courses. *Staff*

57, 58. *Representative American Writers.* Selections and complete works. The first semester includes Poe, Emerson or Thoreau, Hawthorne, Melville, Whitman, Dickinson, and Twain; the second semester includes James, Frost or Robinson, Crane or Dreiser, O'Neill, Faulkner, Hemingway, and others. Open to juniors and seniors with the permission of the Director of Undergraduate Studies. Prospective majors should take 173-176 instead of this course. Two courses. *Staff*

112. *English Literature of the Middle Ages.* A study of the principal forms and examples of English prose, poetry, and drama of the Anglo-Saxon and Middle English periods (excluding Chaucer), read in translation. One course. *Reiss*

115. *Chaucer. The Canterbury Tales* and the minor poems, with attention to their literary and social background. One course. *Nygaard and Reiss*

121, 122. *English Literature: Elizabethan and Seventeenth Century.* A study of the poetry, prose, and drama of the period. First semester: the emphasis in poetry is on Wyatt, Sidney, Spenser, Raleigh, Shakespeare; in prose, on Sidney and Florio's Montaigne; in drama, on Marlowe. Second semester: the chief emphasis is on the metaphysical poets—Donne through Vaughan; in prose, Bacon, Burton, Donne, Browne; in drama, Jonson, Webster, Ford. Two courses. *DeNeef and Krueger*

123, 124. *Shakespeare.* In the first semester twelve plays, before 1600; in the second semester about ten plays, after 1600. Two courses. *Bowman, Krueger, Randall, and Williams*

127. *Milton.* Milton's poetry and prose, their relation to the period and to other great works of literature. One course. *Liesay and Price*

131, 132. *Eighteenth-Century Literature.* The writers emphasized in the first semester are Pope, Swift, Defoe, Addison, Steele, and Fielding; in the second semester, Johnson, Gray, Boswell, Goldsmith, Sheridan, the later novelists, and Blake. Two courses. *Ferguson and Jackson*

138. *The English Novel From the Beginnings to 1800.* Some of the writers studied are Nashe, Deloney, Lyly, Sidney, Bunyan, Behn, Defoe, Richardson, Fielding, Smollett, and Sterne. One course. *Randall*

141, 142. *English Literature of the Early Nineteenth Century.* The

course begins with the forerunners of Romanticism. The chief emphasis in the first semester is on the work of the older Romantics: Wordsworth, Coleridge, Lamb, and Hazlitt. In the second semester the chief emphasis is on the work of the younger Romantics: Byron, Shelley, Keats, and DeQuincey. Two courses. *Clubbe, Patton, and Stevenson*

145, 146. *English Literature, 1832-1900*. A study of the major writers of poetry and prose from Macaulay to Hardy. In the first semester, Macaulay, Tennyson, Carlyle, the Brownings, Newman, Mill, Clough, and FitzGerald; in the second semester, Arnold, the Rossettis, Ruskin, Patmore, Meredith, Huxley, Morris, Swinburne, Pater, and Hardy. Colateral reading from novels of the period. Two courses. *Harwell, Monsman, and Sanders*

148. *The English Novel in the Nineteenth Century*. Some of the writers studied are Scott, Austen, Dickens, Thackeray, Trollope, the Brontës, George Eliot, Meredith, Butler, and Hardy. One course. *Harwell, Monsman, and Stevenson*

153, 154. *Twentieth-Century Poetry*. A study of twentieth-century poetry and criticism of poetry in England and America. Problems in critical analysis and interpretation. First semester: the emphasis is on sources in nineteenth-century Symbolism and on the poetry of Hopkins, Yeats, Eliot, Pound, and Stevens. Second semester: the emphasis is on the poets and the poetic theories of the last thirty years. Two courses. *Bevington*

158. *The English Novel in the Twentieth Century*. Some of the writers studied are Conrad, Lawrence, Forster, Joyce, Woolf, Huxley, Cary, Amis, and Golding. One course. *Mellown and Smith*

159. *Modern British Drama*. English and Irish drama from the late nineteenth century to the present. One course. *Reardon*

173. *American Literature to 1800*. Colonial authors: Bradford, Taylor, Cotton Mather, Edwards, Byrd, and Franklin and authors of the early Republic such as Tyler, Freneau, and C. B. Brown. One course. *Staff*

174. *American Literature from 1800 to 1860*. Prose and poetry of American Romanticism: Emerson, Thoreau, Hawthorne, Poe, Melville, and Whitman. (Not open to students who have taken the old 137.) One course. *Staff*

175. *American Literature from 1860 to 1915*. Dickinson, Twain, James, the social and philosophical essayists, Crane, Dreiser, Robinson, and Frost. (Not open to students who have taken the old 138.) One course. *Staff*

176. *American Literature since 1915*. Poetry, fiction, drama, and critical prose from Stein, Anderson, O'Neill, Hemingway, and Faulkner to such contemporary authors as Malamud and R. Lowell. (Not open to students who have taken the old 138.) One course. *Staff*

177, 178. *American Fiction*. A survey of the novel and the short story. The first semester covers the nineteenth century, from Washington Irving

to Stephen Crane; the second semester covers the twentieth century through ten representative books. Two courses. *Anderson and Budd*

179. *American Drama*. Representative plays from Colonial times to the present: an historical survey. One course. *Reardon*

Conference Courses: Seminars primarily for majors, with priority given to seniors. Emphasis on literary theory and critical writing, with intensive study of one or more authors. One course each; each course may be taken twice.

180S. *Conference on Criticism*.

181S. *Conference on Drama*.

182S. *Conference on Poetry*.

183S. *Conference on Fiction*.

184S. *Conference on Prose Non-Fiction or a Special Topic*.

190. *Oral Interpretation of Literature*. See description under Speech and Theater.

191, 192, 193, 194. *Independent Study*. Directed reading and research. Students desiring to enroll in these courses should consult the Director of Undergraduate Studies as early as possible in the semester preceding the semester in which they wish to take the course. One course each.

197-198. *Senior Seminar in English*. A course designed to offer guidance in the analysis and interpretation of English and American literature to students of superior ability. Comparative studies will be encouraged, and considerable reading will be required in critical and aesthetic theory. Emphasis will be placed upon the final essay. Admission by invitation of the department. Two courses. *Johnson, Jones, Krueger, and Mellow*

Foreign Literatures (in Translation)

163, 164. *Readings in European Literature*. Significant works are read in translation and related to similar works in English literature. The first semester includes selected writings of Homer, the Greek dramatists, Plato, Vergil, and Ovid. The second semester comprises works by Dante, More, Cervantes, Molière, Voltaire, Goethe, Dostoevski, Ibsen, and Kafka. Two courses. *Clubbe and Krueger*

165. *Readings in Scandinavian Literature*. A study of selections in translation from Ibsen, Strindberg, Lagerkvist, and others; their place in the literary tradition of Scandinavia and their relationships with English and American literature. One course. *Anderson*

169. *Modern European Drama*. Ibsen to the present; the free theatre movement and the drama of ideas. One course. *Reardon*

Speech and Theater

50. *Essentials of Public Speaking*. A basic course in public speaking, designed to give the student the poise and confidence necessary to think

and speak freely before an audience. Particular attention is paid to the gathering and organization of speech materials and to oral presentation. Not open ordinarily to juniors and seniors. One course. *Michalak, Reardon, and Schwerman*

100. *English for Foreign Students*. Designed to assist the student to whom English is a second language to perfect his speaking and understanding of the language. Drills in writing, speaking, listening, and the American idiom. Open to all students and their wives, and to any persons and spouses with an official connection with the University. Those who do not pay full-time student fees may register for a fee of \$5.00. No credit. *Wetherby*

110. *Essentials of Public Speaking*. A basic course in public speaking for juniors and seniors dealing with the same matters as 50. (Not open for credit to students who have taken 50.) One course. *Michalak, Reardon, and Schwerman*

119. *History of the Theater*. The origin and development of drama, acting, and stagecraft from ancient Greece to the modern European and American theater. Production problems of representative plays of the various periods will be discussed. Primarily for juniors and seniors; open also to sophomores approved by the instructor. One course. *Michalak*

120. *Stagecraft*. An introductory course on the technical aspects of play production: scenery, lighting, properties, make-up, and costuming. Laboratory work will be coordinated with the various productions of the Duke Players. Primarily for juniors and seniors; open also to sophomores approved by the instructor. One course. *Michalak*

130. *Play Production*. An introduction to the methods of producing a play—theater organization, play selection, casting, and rehearsal. Lectures and laboratory. Primarily for juniors and seniors; open also to sophomores approved by the instructor. One course. *Michalak*

139. *The Speaking Voice*. A study of the mechanisms of speech. Emphasis is placed on providing the skills necessary for the improvement of voice, pronunciation, and diction. Methods of correcting minor functional speech disorders will also be studied. One course. *Schwerman and Wetherby*

140S. *Argumentation*. The principles of argumentation and debating. The techniques of analysis, investigation, evidence, reasoning, brief making, and refutation. Participation in class discussions and debates. Prerequisite: English 50 or 110 or consent of the instructor. One course. *Wetherby*

150. *Persuasive Speaking*. The psychological and sociological techniques used in gaining acceptance of ideas through speech. Study is made of the factors influencing human behavior; audience analysis and motivation; choice, arrangement, and adaptation of material. Extensive practice in persuasive speaking. Prerequisite: English 50 or 110 or consent of the instructor. One course. *Wetherby*

160, 170. *Broadcasting*. A study of the background of radio and television broadcasting. The first semester covers the development of broadcasting as an industry and as a literary form. The second semester studies the legal and social aspects, and the various program forms. Two courses. *Wetherby*

190. *Oral Interpretation of Literature*. A study of poetry and certain types of prose, with practice in the technique by which they may be communicated to an audience. For juniors and seniors; open also to sophomores approved by the instructor. One course. *Schiverman*

Graduate Courses open to Seniors

207, 208. *History of the English Language*. Old to Modern English; developments in phonology, morphology, syntax, and vocabulary. First semester, Old English; second semester, 1100 to the present. Two courses. *Nygard and Reiss*

209. *Present-Day English*. A description of present-day American English from the point of view of modern linguistic theory; comparison of traditional and structural grammars; semantic change; the relation of the written to the spoken language; usage. One course. *Nygard and Reiss*

210. *Old English Literary Tradition*. Poetry: heroic tradition (aside from *Beowulf*), the elegiac tradition, and the Caedmonian and Cynewulfian schools. Prose: Alfred, Aelfric, and Wulfstan. Prerequisite: English 207. One course. *Nygard and Reiss*

212. *Middle English Literary Tradition*. From 1100 to 1500 (excluding Chaucer); medieval genres; reading of selected texts. A reading knowledge of Old or Middle English is recommended. One course. *Nygard and Reiss*

215. *Chaucer. The Canterbury Tales*. One course. *Nygard and Reiss*

216. *Chaucer. Troilus and Criseyde and the Minor Poems*. One course. *Nygard and Reiss*

221. *English Prose of the Sixteenth Century*. Readings in the major forms and authors. One course. *Lievsay*

222. *English Non-Dramatic Poetry of the Sixteenth Century*. Extensive select readings from representative types and authors, excluding Spenser. One course. *Lievsay*

223. *Spenser*. The reading of Spenser's works, with chief attention to *The Faerie Queene*. One course. *Lievsay*

224. *Shakespeare*. The plays. One course. *Williams*

225, 226. *Tudor and Stuart Drama, 1500-1642*. First semester: Peele, Lyly, Greene, Kyd, Dekker, Heywood, Chapman, and Marston, with emphasis on Marlowe. Second semester: Jonson, Webster, Beaumont, Fletcher, Massinger, Middleton, Ford, and Shirley. Two courses. *Randall*

229, 230. *English Literature in the Seventeenth Century*. Major works in prose, poetry, and drama from 1600 to the death of Dryden. Two courses. *Jackson, Lievsay, and Randall*

232. *Milton*. Milton's poetry and prose, with emphasis on the major poems. One course. *Lievsay*

234. *English Drama, 1642-1800*. The heroic play and the comedy of manners of the Restoration; the important plays, serious and comic, of the eighteenth century. One course.

235, 236. *The Eighteenth Century*. Swift, Pope, Defoe, Addison, Steele, and others are studied in the first semester; in the second, Gray, Johnson, Boswell, Collins, Goldsmith, the novelists, and other writers. Two courses. *Ferguson*

241, 242. *English Literature of the Early Nineteenth Century*. The Romantic poets and prose writers from Scott to the early Carlyle, with special attention to Wordsworth, Coleridge, and Keats. Two courses. *Patton, Sanders, and Stevenson*

245, 246. *English Literature of the Later Nineteenth Century*. The first semester is devoted chiefly to Carlyle, Dickens, Thackeray, Tennyson, and Browning; the second semester to Arnold, Ruskin, Pater, George Eliot, Meredith, the Pre-Raphaelites, and Swinburne. Two courses. *Sanders and Stevenson*

251, 252. *English Literature of the Twentieth Century*. Representative work of leading writers from 1900 to 1950, in fiction, drama, and poetry. The first semester will include Shaw, Conrad, Yeats, Wells, Bennett, Galsworthy, Ford, Synge, Forster, and Lawrence; the second semester, Joyce, Woolf, Edith Sitwell, Eliot, Huxley, Graves, Bowen, Auden, and Dylan Thomas. Critical analysis of selected texts, with discussion of techniques and ideas. Two courses. *Mellown and Smith*

263, 264. *American Literature, 1800-1865*. The writers emphasized in the first semester are Emerson, Thoreau, and Hawthorne; in the second semester, Poe and Melville. Two courses. *Budd, Jones, and Turner*

267, 268. *American Literature, 1865-1920*. Selected works of representative authors of the period. The first semester will include Whitman, Lanier, Mark Twain, James, Howells, Emily Dickinson, Henry Adams, and the Local Colorists; the second semester, Crane, Norris, Moody, London, Dreiser, Edith Wharton, Willa Cather, O'Neill, Robinson, and Frost. The lectures will deal primarily with literary trends as shaped by the social background. Two courses. *Gohdes*

270, 271. *Southern Literature*. The principal authors and the chief literary developments from the beginnings to the present. Emphasis in the first semester is on Byrd, Kennedy, Simms, Poe, Timrod, and the humorists; in the second on Lanier, Harris, Cable, Mark Twain, Ellen Glasgow, and Faulkner. Attention is given to the historical and cultural background and to literary relations extending outside the region. Two courses. *Turner*

275, 276. *American Literature Since 1920*. First semester, selected fiction from Gertrude Stein to the present. Second semester, poetry from the Imagist movement to the present. Two courses. *Duffey and Strandberg*

277. *Major Developments in Contemporary American Poetry*. The principal contributions to modern poetry made by American poets, including imagism and the new poetry; Eliot, Stevens, Hart Crane, the "Fugitives," and a selection from the poets of the present generation. One course.

280. *Introduction to Folklore*. A survey of the materials of popular tradition, the folksong, the folktale, the proverb, the riddle, and other forms; the methods of folklore investigation; and the relation of these popular genres to literary tradition. One course. *Nygard*

285. *Literary Criticism*. Readings from the major critics, Plato to the present, with emphasis on formative ideas and historical continuity. One course. *Lievsay*

287. *Recent Critical Thought*. Questions of the nature and value of literature as reflected in recent criticism, theoretical and practical. One course. *Duffey*

289. *Literary Biography*. Selected works from Plutarch to Strachey with discussion of the historical development of biography, the various methods it has used, and the various theories which have been held about it. One course. *Sanders*

Departmental Major

Basic Requirement. English 55-56.

Major Requirements. Six courses above the sophomore level including: one course in one of the major authors: Chaucer, Shakespeare, Milton; two courses in one of the two-semester historical surveys of British or American Literature; two courses in areas not represented by the historical survey chosen (one in each area)—(a) British Literature before 1800, (b) British Literature after 1800, and (c) American Literature; and one additional course given in the English Department (in writing, speech, drama, literature, or language).

The Department offers work leading to graduation with distinction. See the section on Honors in this *Bulletin*.

Forestry

Students without a bachelor's degree who are preparing for work in forestry as a profession should take the courses outlined under the Academic-Forestry Combination outlined in the section on Requirements for Degrees. However, with the consent of the instructor in charge,

certain forestry courses may be elected by students in other curricula provided they have had adequate preparation (see *Bulletin of the School of Forestry*).

Members of the sophomore, junior, and senior classes, whether or not registered in the Forestry Combination Program, may elect the following course:

152. *Conserving Natural Resources*. Fundamentals of natural resource development, use, management and protection based on principles of the natural and social sciences. 1 course. *Staff*

French

For courses offered in French, see *Romance Languages*.

Genetics—The University Program in Genetics

Professor Gross, *Director* (on leave 1969-70); Associate Professor Ward, *Director* (1969-70); Professors Buettner-Janusch (Anatomy and Zoology), Gross (Biochemistry), Guild (Biochemistry), and Perry (Botany); Associate Professors Gillham (Zoology) and Ward (Zoology); Assistant Professors Boynton (Botany), Counce (Anatomy), Hall (Biochemistry), Harriman (Biochemistry), Kelley (Biochemistry and Medicine), and Kredich (Biochemistry and Medicine)

The University Program in Genetics provides a coherent course of study in all facets of biology related to genetics. Students interested in preparation for advanced work in genetics or wishing to take an interdisciplinary major in this area should consult with Dr. Ward (032 Biological Sciences Building). Information concerning interdisciplinary programs involving biology may be found on page 24 of this *Bulletin*.

For a description of the following courses consult the listings under the specified departments.

71. *Heredity and Society*. (Listed as Zoology 71.) One course. *Ward*

*101. *Principles of Heredity*. (Listed as Botany 101.) One course. *Staff*

180. *Principles of Genetics*. (Listed as Botany 180, Botany 280, Zoology 180, and Zoology 280.) One course. *Boynton, Gillham, and others of the University Program in Genetics*

182. *Principles of Genetics Laboratory*. (Listed as Botany 182 and Zoology 182.) Half-course. *Boynton and Gillham*

*Not offered in 1970-71.

For Seniors and Graduates

232. *Human Genetics*. (Listed as Anatomy 232, Anthropology 232, and Zoology 232.) One course. *Buettner-Janusch*

280. *Principles of Genetics*. (Listed as Botany 280 and Zoology 280.) One course. *Boynton, Gillham, and Staff*

282. *Experimental Genetics*. (Listed as Biochemistry 282.) Half-course. *Hall, Harriman, and Staff*

288. *The Cell in Development and Heredity*. (Listed as Anatomy 288 and Zoology 288.) Half-course. *Counce, Gillham, and Staff*

Independent Study and *Special Problems* are offered in the Department of Botany under numbers 191, 192, 193, 194, 225, and 226, and in the Department of Zoology under numbers 197 and 198. A student should obtain the permission of both the instructor with whom he wishes to work and the appropriate director of undergraduate studies before registering for *Independent Study* or *Special Problems*.

Geology

Associate Professor Heron, *Chairman*; Associate Professor Furbish, *Director of Undergraduate Studies*; Associate Professors Perkins and Pilkey; Assistant Professors Blanton and Lynts

1. *Physical Geology*. Physical processes acting on the earth, composition of the earth, and earth structures. Three one-hour lectures and one two-hour laboratory. One course. *Heron and Perkins*

1P. *Preceptorial*. Field trips. Four hours once a month on Saturday. *Staff*

2. *Historical Geology*. History of the earth, its physical development, and the geological evolution of life. Three one-hour lectures and one two-hour laboratory. One course. *Heron and Lynts*

2P. *Preceptorial*. A weekend field trip to the classic Paleozoic section in the Appalachians of Virginia and West Virginia in early April, and a one day field trip through the Durham and Deep River Triassic River Basins in early May. *Staff*

53. *Introductory Oceanography*. Basic principles of physical, chemical, biological, and geological oceanography. Prerequisite: one year laboratory science or concurrent enrollment in a laboratory science. (Also listed as Botany 53.) One course. *Pilkey and Searles*

101. *Crystallographic Mineralogy*. Definition of the crystalline state, lattice and group concepts, indices, crystal systems, classification, and crystal morphology. Lectures and laboratory. One course. *Furbish*

102. *Fundamentals of Mineralogy*. Crystal chemistry, crystal physics, mineral identification and genesis. Lectures or recitations, laboratory,

and field trips. Prerequisite: Chemistry 2 (may be taken concurrently) and Geology 101. One course. *Furbish*

106. *Igneous and Metamorphic Rocks*. Silicate mineralogy, theory of origin and classification of igneous and metamorphic rocks and rock identification. Lectures and laboratory. Prerequisite: Geology 102. Half-course. *Furbish*

108. *Sedimentary Rocks*. Authigenic and detrital minerals, theory of origin and classification of sedimentary rocks and rock identification. Lecture, laboratory and field trips. Prerequisite: Geology 1. Half-course. *Heron*

164. *Introduction to Geologic Field Methods*. Principles and techniques used in geologic mapping and field studies including applicable methods of surveying and the use of aerial photographs. Lectures, laboratory and field trips. Prerequisites: Geology 1 and 2. One course. *Furbish*

175, 176. *Majors Seminar*. Review of current literature in selected fields of geology. Required of all majors: 175 in the spring of the junior year, 176 in the spring of the senior year. Half-course. *Staff*

191, 192. *Independent Study*. Directed reading and research. Open only to highly qualified juniors and seniors, by permission of the Director of Undergraduate Studies. Two courses. *Staff*

For Advanced Undergraduates and Graduates

204. *Physical Oceanography*. Physical processes affecting oceans. Laboratory and field work. Prerequisites: One year of physics, chemistry, calculus, and a general oceanography course or permission of instructor. (Given at Beaufort only.) Two courses.

205. *Geological Oceanography*. The study of the broad geologic aspects of the ocean basins, including origin, bottom physiography, sediment distribution and sedimentary processes. Observations in the field will be emphasized and will include training in sampling procedures for both shallow and deep water. Not open to students who have completed Geology 206. (Given at Beaufort only.) Two courses. *Pilkey*

206. *Principles of Geological Oceanography*. A survey of geological aspects of the oceans including sediment types, processes of sedimentation, geologic structures of the ocean basins, and bottom physiography. Prerequisite: Geology 108 or consent of instructor. One course. *Pilkey*

208. *Shallow-Marine Geology*. Physical and biological processes responsible for sediment production, accumulation, and alteration in the shallow-marine environment. Prerequisite: Geology 108 or consent of instructor. One course. *Perkins*

211. *Stratigraphic Principles and Application*. Prerequisite: Geology 108. One course. *Perkins*

213. *Sedimentology*. Parameters of sedimentation, sediment classifica-

tion, and laboratory methods of analysis. Prerequisites: Geology 108 or consent of instructor. One course. *Pilkey*

214. *Sediments in Thin Section*. Study of sediments and sedimentary rocks using the petrographic microscope and related techniques. Prerequisites: Geology 213. One course. *Perkins*

222. *Sedimentary Minerals*. Structure and geologic occurrences of selective detrital and authigenic minerals including the clay minerals. Theory and use of X-ray diffraction, differential thermal analysis, and thermal gravimetric analysis. Prerequisite: Geology 102 or consent of instructor. One course. *Heron*

229. *Economic Geology*. Principles and processes involved when elements are concentrated to economic proportions in magmatic, metamorphic, hydrothermal, sedimentary, or surface environments. Prerequisite: Geology 102. One course. *Furbish*

230. *Principles of Structural Geology*. Description, origin, and interpretation of primary and secondary geologic rock structures. Prerequisites: Geology 106 and 108. Given biennially. One course. *Furbish*

241-242. *Invertebrate Paleontology*. Biologic and stratigraphic relationships of fossil invertebrates, with special emphasis on evolutionary trends of invertebrates as interpreted from fossil evidence. Lectures, and laboratory. Prerequisites: Geology 1, 2, or consent of instructor. Given biennially. Two courses. *Lynts*

243-244. *Micropaleontology*. Microscopic animal and plant fossils, exclusive of spores and pollen, with special emphasis on their biology, taxonomy, evolution and stratigraphic distribution. Lectures and laboratory. Prerequisites: Geology 241-242, or consent of instructor. Given biennially. Two courses. *Lynts*

247. *Paleoecology*. Application of ecologic and geologic principles to the reconstruction of the interrelationship between organisms and their environment in geologic time. Prerequisites: Geology 213, 242, or consent of instructor. Given biennially. One course. *Lynts*

251. *Geomathematics*. Application of quantitative techniques, including geometrics, to the characterization and solution of geologic problems. Prerequisites: Geology 2, a course in statistics, or consent of instructor. Given biennially. One course. *Lynts*

Departmental Major

For the A.B. degree the Department of Geology offers two programs.

1. Geology

Prerequisites: Geology 1 and 2, Chemistry 1 and 2 (or 41), and Mathematics 31 and 32 (or 68 and 113).

Major Requirements: A minimum of eight geology courses above the

introductory levels, including 101, 102, 106 (1/2), 108 (1/2), 164, 175 (1/2), 176 (1/2), 211 and 230.

2. *Geology, Preparatory to Advanced Studies in Oceanography*

Prerequisites: Geology 1, 2, and 53 (or 206), Chemistry 1 and 2 (or 41), Physics 1 and 2 (or 41), Botany 11 and 12 or Zoology 11 and 12, Calculus and 3 courses of science electives.

Major Requirements: A minimum of six geology courses above introductory, including 101, 102, 106 (1/2), 108 (1/2), 175 (1/2), 176 (1/2), 211 and 230.

For the B.S. degree.

Prerequisites: Geology 1 and 2, Chemistry 1 and 2 (or 41), Mathematics 51, plus either 68 and 113 or 31 and 32.

Major Requirements: A minimum of ten courses, above introductory, including 101, 102, 106 (1/2), 108 (1/2), 175 (1/2), 176 (1/2), 211, 230 plus a field course normally taken during the summer of the junior year.

Germanic Languages and Literature

Professor Salinger, *Chairman*; Professor Phelps, *Director of Undergraduate Studies*; Lecturer Bessent, *Supervisor of Freshman Instruction*; Associate Professor Maxwell; Assistant Professors Alt, Novak, and Stern; Visiting Assistant Professors Romero and Thaller; Instructors Klables, Koeppe, Hartwig, and Krebs

1-2. *Elementary German.* Practice in understanding, speaking, reading, and writing. Classroom techniques are combined with those of the language laboratory. Two courses. *Bessent and Staff*

63-64. *Intermediate German.* Prerequisite: German 1-2 or equivalent. Two courses. *Novak and Staff*

German 63-64 or equivalent is prerequisite for 91, 92 and all 100-level courses.

91, 92. *Introduction to German Literature.* Readings from representative German authors. Two half-courses. *Stern and Staff*

91P, 92P. *Preceptorial.* Preceptorial for 91, 92.

105. *Composition.* Syntax with practice in the elements of German expository prose style, restricted to majors. Half-course. *Thaller*

107, 108. *Scientific German.* The German language as used in various sciences. Two half-courses. *Klables*

109, 110. *German Prose Fiction.* Origin and development of the German novel and short story with special emphasis on the nineteenth century. Two courses. *Alt*

109P, 110P. *Preceptorial.* Preceptorial for 109, 110.

115, 116. *German Drama of the Nineteenth Century*. A study of leading dramatists from Kleist to Hauptmann. Two courses.

117, 118. *German Conversation*. A course primarily in speaking German with some practice in writing, restricted to German majors and other students by permission of the department. Two courses. *Bessent*

119, 120. *Survey of German Literature*. German literature and its cultural background. First semester: from the beginnings to the Romantic period. Second semester: from Romanticism to the present. Lectures, reports, and reading. Two courses. *Romero*

125, 126. *Contemporary German Literature*. A study of representative works of the twentieth century. Two courses. *Novak*

131, 132. *Introduction to the Age of Goethe*. Selected works of Lessing, Goethe, and Schiller. Two courses. *Phelps and Salinger*

133, 134. *The German Lyric*. A survey of the development of German lyric poetry, principally from Klopstock to Rilke (with some attention to mediaeval and early modern poets), seen as poetic reflection of German thought. Two courses. *Salinger*

133P, 134P. *Interpretation of German Poems*. By written permission of instructor only. Preceptorial for 133, 134. *Salinger*

171, 172. *German Literature in English Translation*. The great epochs in German literature studied through English translations of representative masterpieces. Two courses.

191, 192. *Independent Study*. Directed reading and research. Open only to qualified students in the junior year, by permission of the department. Two courses. *Alt, Novak, Phelps, and Salinger*

193, 194. *Independent Study*. Directed reading and research. Open only to qualified students in the senior year, by permission of the department. Two courses. *Alt, Novak, Phelps, and Salinger*

Each year several 200-level courses will be designated as seminars.

201, 202. *Goethe*. A study of his life and works, in the light of his lasting significance to Germany and world literature. First semester: lyrics, prose, fiction, and selected dramas; second semester: *Faust, I & II*. Two courses. *Phelps*

203, 204. *Eighteenth Century*. Eighteenth-century German literature in its relation to European intellectual currents of that time. Two courses. *Phelps*

205, 206. *Middle High German*. The language and literature of Germany's first classical period. Two courses. *Stern*

207, 208. *German Romanticism*. The principal writers of the period from 1800 to 1850. Two courses

209, 210. *Kleist, Grillparzer, and Hebbel*. The development of the drama in Germany and Austria between Schiller and Naturalism. Two courses. *Alt and Salinger*

211, 212. *Nineteenth-Century Literature*. From the end of Romanticism through Realism. Two courses. *Alt*

213. *Heinrich Heine*. A study of the poet and his impact on his age. One course. *Salinger*

214. *The Twentieth Century*. Literature of the twentieth century presented through representative authors. One course.

215. *Seventeenth-Century Literature*. A study of the leading writers of the Baroque, viewed against the background of their time. One course.

216. *History of the German Language*. The development of the phonology, morphology, and syntax of German from earliest beginnings to the present. One course. *Stern*

217. *Renaissance and Reformation Literature*. The period from 1400 to about 1600. One course.

218. *The Teaching of German*. A survey of modern teaching techniques: problems in the teaching of German on the secondary and college levels. Analysis and evaluation of textbooks and related audiovisual materials. One course. *Phelps*

230. *German Cultural History*. A study of the background of German civilization and culture (Kulturkunde) from earliest times down to the most recent. One course.

Dutch

181-182. *Dutch*. Intensive introduction to the language of the Netherlands. Modern readings. Completion at second year college level (or equivalent) of another foreign language will normally be required. Two courses. *Stern*

Departmental Major

Prerequisites: German 1-2 and 63-64, or equivalent.

Major Requirements: Conversation (German 117, 118), or equivalent, plus six advanced courses in the German Department, three of which must be on the 200-level. Additional courses from other fields will be selected in consultation with the departmental adviser.

Greek

For courses in Greek, see *Classical Studies*.

Health and Physical Education

Trinity College and The School of Engineering

Mr. Cameron, *Director of Physical Education and Athletics*; Professor Friedrich, *Chairman of Physical Education*; Assistant Professor Corrie,

Supervisor of Intramurals; Associate Professor Skinner, *Supervisor of Freshman Instruction*; Professor Falcone; Associate Professors Buehler, Cox, and Persons; Assistant Professors Davis, Harvey, LeBar, and Reibel; Instructors Butters, Coble, Hagler, and Brown, Assistant Instructors Campbell, Gilchrist, and Lutz

Required Physical Education for Men—Instructional Courses

Two years of physical education are required for graduation unless a student is excused for medical reasons. The requirement is met by satisfactory completion of four semesters of physical education instructional courses or by an alternate form of activity approved by the Men's Physical Education Department. This work must be started in the freshman year and is normally completed in the sophomore year.

Letter grades are given in all physical education instructional courses, but these grades are not counted toward continuation, graduation, or honors; nor are physical education instructional courses counted among the 32 courses needed for graduation.

All students are given a medical and physical examination before registration. Freshmen who have physical handicaps must register in Adapted Physical Education—P.E. 11 and P.E. 12 Sophomores in P.E. 13 and 14. Students assigned to these classes take work adapted to their particular needs and capacities. Freshmen students lacking in basic fitness and proficiency are given special attention in an individual development class.

Physical Education 1. Students not assigned to adapted physical education will register in P.E. 1—Foundations of Physical Education. The fall program for freshmen has been specifically designed to provide the student with a broader concept of the "how" and "why" physical activity. It includes an extensive battery of tests and involves information and activities related to interpretations of health and fitness, training techniques, relaxation techniques, weight control, body mechanics, and posture control. Students have an opportunity to improve their level of fitness and become acquainted with various sports activities through a special orientation program.

On the basis of the test results and other factors, such as a body type, students are guided into those areas which can best help them develop their physical potential and provide for their present and future needs. Students who cannot swim are required to learn to swim during the freshman year.

During the second semester, students are enrolled in those activities best suited to them. Activities are selected from the various course offerings.

After a student completes freshman physical education (P.E. 1), he may fulfill his physical education requirement by electing and satisfac-

torily completing three courses from the following individual, dual, and team sports:

Developmental

- P.E. 11 Freshman Adapted P.E. (Fall Term.)
- P.E. 12 Freshman Adapted P.E. (Spring Term.)
- P.E. 13 Sophomore Adapted P.E. (Fall Term.)
- P.E. 14 Sophomore Adapted P.E. (Spring Term.)
- P.E. 15 Individual Development (conditioning, posture, weight control, fundamental movement.)

Aquatics

- P.E. 20 Beginning Swimming
- P.E. 21 Intermediate Swimming
- P.E. 25 Swimming and Life Saving
- P.E. 26 Advanced Swimming and Water Safety

Individual and Dual Sports

- P.E. 30 Golf (\$20.00 fee required)
- P.E. 32 Handball and Badminton
- P.E. 34 Bowling (\$10.00 fee required)
- P.E. 35 Track and Field

Combination Sports

- P.E. 40 Basketball and Outdoor Sports
- P.E. 41 Lacrosse—Soccer
- P.E. 42 Tennis—Volleyball

Gymnastics

- P.E. 50 Tumbling, Rebound Tumbling, and Apparatus

Combatives

- P.E. 60 Combatives

Team Sports (Requires department approval)

- P.E. 80 Team Sports (Spring term, freshmen.)
- P.E. 81 Team Sports (Fall term, sophomore.)
- P.E. 82 Team Sports (Spring term, sophomore.)

Elective-Professional Physical Education Courses

(Men)

The courses listed below are arranged to meet the increasing demand for teachers who are qualified to coach and teach physical education as well as for those who may have leadership responsibilities in the area of recreation. These courses are open as elective for students in high-school

teaching programs and others for whom such courses may be appropriate. Teaching majors may elect six semester-courses from courses in this group. Two semester-courses may be elected from the courses listed under Special Methods in Physical Education; three semester-courses from the courses listed under Theory and Practice in Physical Education, and one semester-course from Health Education. The courses must be selected with the prior approval of the Director of Undergraduate Studies from the student's major department, in order to meet the needs of the individual.

Special Methods in Physical Education

163. *Athletic Coaching in Secondary Schools.* Theory and practice in the fundamentals of coaching baseball and track. Open to juniors and seniors. One course. *Buehler and Butters*

164. *Athletic Coaching in Secondary Schools.* Theory and practice in the fundamentals of coaching football and basketball. Open to juniors and seniors. *Falcone and Brown*

Theory and Practice in Physical Education

65. *History and Principles of Physical Education.* Investigation of the objectives and scientific principles upon which physical education is based. The history of physical education is studied in order to show the changes in objectives, principles, and methods and as an aid in the interpretation of trends. One course. *Friedrich*

66. *Recreational Leadership.* Theories and philosophies of play and recreation with emphasis on leadership and application to community organizations, school and family situations. One course. *Friedrich*

182. *The Administration of Physical Education and Athletics in Secondary Schools.* A case study appraisal of athletic health and physical education problems experienced in the organization and administration of athletics health and physical education. Open to juniors and seniors. One course. *Davis*

190. *Protective Practices in Physical Education.* A study of safety and protective measures, including training and rehabilitation. Open to juniors and seniors. One course. *Davis*

Health Education

132. *School Health Problems.* A course designed (a) to familiarize the teacher with school health problems such as physical screening, communicable disease prevention and control, healthful school environment; (b) to present methods and materials for health teaching in elementary and secondary schools. One course. *Friedrich*

The Woman's College

Professor Elizabeth Bookhout, *Chairman*; Professor Lewis, *Director of Undergraduate Studies*; Associate Professors Eddy, Holton, Spangler, and Uhrhane; Assistant Professors Lloyd, Raynor, Woodyard, and Wray; Instructor Kelley, and Part-Time Instructor Hackney

Required Physical Education For Women

Two years of physical education are required for graduation unless a student is excused for medical reasons. The requirement is met by satisfactory completion of four semesters of physical education activity courses or by an alternate form of activity approved by the Women's Physical Education Department. This work must be started in the freshman year and is normally completed in the sophomore year. Letter grades are given in all physical education courses, but these grades are not counted toward continuation, graduation, honors, or among the 32 courses needed for graduation.

Students elect courses to meet the requirement with one exception; namely, students who are unable to pass a survival swimming test must take a swimming course. The results of a physical examination and a series of skill tests given during Freshman Week are used to advise students in course selection. In most courses there are beginning, intermediate, and advanced sections. Classes in adapted physical education are arranged for students who are restricted from vigorous activity; special sections are provided for those with meager background or low motor ability; there are rapid-learning "X-sections" for students with exceptionally high motor ability.

Physical Education Activity Courses

1-2. *Freshman Activity Courses.* Each semester students take a full-semester or two half-semester activity courses selected from those listed below. They take a beginning, intermediate or advanced section according to their skill background.

51-52. *Sophomore Activity Courses.* Different or more advanced activity courses selected from those listed below.

Full-Semester Courses

Modern Dance: Beg., Int., and Choreography

Tennis

Water Safety Instructor's Course

Half-Semester Courses

Archery: Beg. & Int.

Badminton: Beg. & Int.

Basketball: Int.

Bowling: Beg. & Int.

Conditioning Exercises

Diving

Fencing: Beg. & Int.
 First Aid
 Folk Dance: Beg. & Int.
 Golf: Beg., Int. & Adv.
 Gymnastics: Beg. & Int.
 Hockey
 Posture and Movement
 Rec Ball
 Rhythmic Gymnastics
 Riding: Beg., Int. & Adv.
 Senior Life Saving

Softball
 Speedball
 Sports Fundamentals
 Square Dance
 Swimming: Beg., Int., Adv.,
 Synchronized & Competitive
 Tap Dance: Beg.
 Tennis: Beg., Int. & Adv.
 Track and Field
 Volleyball

Theory Courses in Physical Education

The courses listed in this section are open to students of The Woman's College majoring in physical education and are available as electives to students majoring in other areas. The following courses meet distributional requirements in the social science division: P.E. 49S, 113D, 114, 130S, and 195S.

49S. *History and Principles of Physical Education*. Relationship of physical education to the social, political, and religious customs of different nations and periods. Principles of natural and social science upon which physical education is based. One course. *Lloyd*

102. *Physical Education for Early Childhood*. A study of physical education for grades K-3. Theory and practice in teaching basic skills, rhythms, and games to young children. Half-course. *Lewis*

103. *Physical Education for the Intermediate Grades*. A course in planning, organizing, and conducting physical education programs for children in grades 4-9. Practice in teaching activities appropriate to this age group. Half-course. *Lewis*

105, 106. *Methods and Materials in Recreation*. A course to develop leadership in recreational activities. Recommended for students interested in camping, scouting, Peace Corps, and Operation Breakthrough. Laboratory work includes experience with a recreational group in a city organization. Areas covered: games, social activities, folk and square dancing, crafts, drama, song-leading, and story-telling. Open to sophomores, juniors, and seniors. Two courses. *Holton*

113D. *Mammalian Anatomy*. A study of the organ systems of man, with emphasis on osteology, arthrology, and myology. Prerequisite: Biology 11-12 or Zoology 11-12. One course. *Bookhout*

114. *Kinesiology*. A study of muscle function and analysis of human movement. Prerequisite: P.E. 113 or Zoology 53. One course. *Bookhout*

117. *Adapted Physical Education*. Analysis of exercises and activities

appropriate to individual needs. Theory and practice in planning and conducting adapted programs. Half-course. *Bookhout*

119S. *Organization and Administration of Physical Education*. A seminar on curriculum building; administration of required, intramural, and extramural programs; problems of budget, facilities, legal aspects, public relations, and safety. One course. *Staff*

120. *Measurement and Evaluation in Physical Education*. The contribution of measurement and evaluation to the teaching process. Practice in test selection, administration, and interpretation. Half-course. *Bookhout*

130S. *History of the Dance*. A survey of dance through the ages, with emphasis on study of form, structure, and content of this creative art as it relates to the culture of each era. One course. *Wray*

132. *Creative Rhythms in Movement*. Basic theory and experience in creative rhythmic movement for grades K-12. The study of the classification and elements of movement with observation and practical experiences with children. Recommended for those students interested in dance, music, recreation, and elementary and secondary teaching. One course. *Hackney*

133. *Social, Folk and Square Dance Forms*. A study of the historical development, materials, and resources of the social, folk, and square dance forms including evaluation procedures and practical teaching experience. Half-course. *Wray and Holton*

181. *Methods and Materials in Team Sports*. Basic theory and practice in teaching team sports for women. One course. *Spangler and Woodyard*

182. *Methods and Materials in Individual and Dual Sports*. Basic theory and practice in teaching these sports. One course. *Lewis and Staff*

185. *Advanced Methods of Teaching and Officiating*. One course. *Lewis and Staff*

195S. *Recent Research in Physical Education and Related Fields*. One course. *Staff*

Health Education Courses

The following health education courses meet distributional requirements in social science: H.E. 137, 138S, 140S and 170T.

101-102. *Health Education Fundamentals, Methods, and Materials*. Designed specifically for and open only to physical education majors. Basic studies in personal and community health; administration; curriculum and program planning; health services and health counseling; selection, purchase, and care of equipment; library sources; methods and materials for effective health teaching; evaluation techniques and procedures. Two courses. *Uhrhane*

134. *School Health*. Organization of the school health program; basic health problems in schools; methods and materials for teaching about health. Primarily designed for students preparing to teach in elementary or secondary schools. Open to men and women. Juniors and seniors only. Half-course. *Uhrhane*

137. *Health in Developing Countries*. Study of health conditions, practices, and problems interacting with economics, productivity, and progress of emerging nations. Concentrated study of selected countries will be used to exemplify the problems and possibilities. Open to men and women. One course. *Uhrhane*

138S. *Health Problems in Metropolitan Areas*. Study of selected problems such as water and air pollution, radiation, drug abuse, health quackery; and study of health as interrelated with poverty, population motion, food distribution, housing, and city planning. Open to men and women. One course. *Uhrhane*

140S. *Gereology and Health*. Seminar designed to help the college age person understand and appreciate health as interrelated with aging. Topics to be explored include: health implications in the changing role of the elderly in modern society; problems of illness, accidents, and medical care; and health implications of retirement and extended leisure time. Open to men and women. One course. *Uhrhane*

170T. *Special Health Problems*. Problems and issues in health affairs selected by students for independent study. Open to men and women. One course. *Uhrhane*

Major in Physical Education

A major in physical education is offered to students in the Woman's College who wish to prepare for teaching physical education, recreational leadership, physical therapy, or graduate study. The program may also be planned with emphasis on dance or health.

Prerequisites. Biology 11-12 or Zoology 11-12.

P.E. 49S. *History and Principles of Physical Education*.

Major Requirements. Eight courses distributed as follows:

P.E. 113D. *Mammalian Anatomy*

P.E. 114. *Kinesiology*

Zoology 151. *Principles of Physiology*

One course in health education.

One seminar selected from P.E. 119S, P.E. 195S, H.E. 138S or H.E. 140S.

Three additional courses in physical education or health education.

Note: Students who are interested in full-time or part-time teaching in physical education and health should consult the Director of Undergraduate Studies in the Women's Physical Education Department for course selection to meet appropriate certification requirements.

History

Professor Colton, *Chairman*; Associate Professor Young, *Director of Undergraduate Studies*; Associate Professor W. Scott, *Supervisor of Freshman Instruction*; Professors Alden, Durden, Embree, Ferguson, Hamilton, Hillerbrand, Holley, Lanning, Parker, Preston, Ropp, Silberman, TePaske, and Watson; Associate Professors Acomb, Brieger, Davis, Ginter, Hollyday, Lerner, A. Scott, and Uhalley; Assistant Professors Cahow, Cell, Dunn, Mauskopf, Miller, and Nathans; Instructors Forry, Gavins, Lischka, and Payne; Visiting Lecturer Kiwanuka

The undergraduate courses in history are designed to afford (1) an introduction to the study of history; (2) a more intensive study of general American history; (3) opportunities for more advanced study of phases of American, English, European, Hispanic-American, Russian, African, and Asian history.

Prerequisite. A year sequence (2 courses) selected from one of the following introductory courses (1D-2D, 1S-2S, 51-52, 53-54, 61D-62D, 91-92) or the equivalent through advanced placement or reading out of the courses is prerequisite for all other courses. However, seniors may take advanced courses without these prerequisites if they secure the permission of the instructor and the Director of Undergraduate Studies.

1D, 2D. *A History of European Civilization.* Major problems in the development and world impact of European civilization, critical evaluation of historical interpretations, and investigation of history from primary sources. From the Ancient Greeks to the present. Two courses. Open only to freshmen except by approval of the Director of Undergraduate Studies; lectures and small discussion groups. *Staff*

1S, 2S. *A History of European Civilization.* Seminar open to freshmen by application and interview. Two courses. *Mauskopf*

51, 52. *A History of European Civilization.* From the Italian Renaissance to the present. (Not open to students who have had History 1-2.) Two courses. *Staff*

51P, 52P. *Preceptorial.* Optional weekly preceptorial added to History 51, 52. *Hillerbrand*

53. *Greek History.* (Listed also as Classical Studies 53.) One course. *Oates*

54. *Roman History.* (Listed also as Classical Studies 54.) One course. *Oates*

61D, 62D. *Non-Western Civilizations.* Traditional ideas and institutions of non-Western societies, and effects of modernization; lectures and small discussion groups. Two courses. *Embree, Kiwanuka, Silberman, TePaske, and Uhalley*

91. *The Development of American Democracy to 1865.* A study of the trends vital to an understanding of the United States today. The main

theme is the development of American democracy. Problems of foreign policy, the growth of capitalism, political practices, social reform, and conflicting ideals are considered in relation to this main theme. One course. *Cahow, Davis, Durden, Forry, Gavins, Holley, Nathans, and A. Scott*

92. *The Development of American Democracy, 1865 to the Present*. A continuation of History 91 with emphasis upon the emergence of contemporary problems. One course. *Cahow, Davis, Durden, Forry, Gavins, Holley, Nathans, and A. Scott*

91P, 92P. *Preceptorial*. Optional weekly preceptorial added to History 91, 92. *A. Scott*

Other Undergraduate Courses

83, 84. *Afro-American History, 1619 to the Present*. The Black experience in the United States from slavery to the contemporary age. (Open to majors in Afro-American Studies without prerequisite.) Two courses. *Gavins*

93. *Modern Technology*. An introduction to the history of modern Western technology, with special emphasis on the nineteenth and twentieth centuries. Technological development will be related to the political, economic, and scientific trends discussed in History 1, 2 or 51, 52. One course. *Ropp*

99. *Naval History and Elementary Strategy*. After a review of earlier periods, attention is given to the importance of sea-power in more recent times and to naval actions, especially in the two World Wars. This course is not open to students who have had N.S. 102. One course. *Ropp*

101, 102. *Introduction to the Civilizations of Southern Asia*. (See Interdisciplinary Course 101, 102.)

103, 104. *Renaissance and Reformation*. Europe, 1300-1648, with special attention to intellectual, religious, and social movements. Two courses. *Hillerbrand*

105, 106. *Political and Constitutional History of England*. The origins and evolution of the principal institutions of the English government, related to their setting in a changing society. Two courses. *Hamilton*

107, 108. *Social and Cultural History of England*. English history from the fourteenth century to the present time in an effort to arrive at a synthesis of social and political events and thus provide a background for the study of English literature. Two courses. *Ferguson*

111, 112. *America in the Colonial and Early Modern Era*. The history of America from the discovery to the beginning of the Civil War. Two courses. *Alden*

113, 114. *America in the Twentieth Century*. Political, economic, and social problems of twentieth-century United States. Emphasis is placed on reform movements from the Muckrakers through the Fair Deal, the

emergence of the United States as a world power with conflicting ideas and ideologies. Two courses. *Watson*

115, 116. *History of Africa*. Social, political, and economic developments in tropical Africa. First semester: cultural background and pre-colonial history. Second semester: colonial and contemporary times. Two courses. *Kivanuka*

117, 118. *European Imperialism and Colonialism*. The age of discovery, the new imperialism, and modernization of post-colonial societies. Two courses. *Cell*

119, 120. *History of Socialism and Communism*. The origins and development of socialist and communist movements from pre-Marxian times to the present. Two courses. *Lerner*

121, 122. *Diplomatic History of the United States*. Emphasis on those factors, foreign and domestic, that have shaped the foreign policies of the Republic. Two courses. *Davis*

123, 124. *City and Frontier in American History*. The westward movement and the progress of urbanization with attention to the social and political consequences. Two courses. *A. Scott*

125. *The Athenian Empire*. (Listed also as Classical Studies 134.) One course. *Staff*

126. *Alexander the Great*. (Also listed as Classical Studies 135.) One course. *Staff*

127. *History of Latin America through the Formation of the National Governments*. One course. *Lanning and TePaske*

128. *Inter-American Affairs*. This course treats the relations of the Latin-American states with each other and with the United States with the design of explaining the current significance of Latin America. Chief emphasis is placed upon social problems and movements common to all the republics and upon the role of the United States in Latin-American affairs. One course. *Lanning*

129, 130. *Society and Government in the United States, 1789-1877*. Two courses. *Nathans*

131. *Mexico and the Caribbean from the Wars of Independence to the Present*. One course. *TePaske*

132. *The Major South American Powers from the Wars of Independence to the Present*. One course. *TePaske*

133, 134. *Medieval History*. Europe, 300-1500. Two courses. *Young*

135, 136. *Europe in the Twentieth Century*. Political, economic, and intellectual developments in Europe since 1900. First semester to 1933; second semester to the present day. Two courses. *Colton*

137, 138. *Foreign Relations of the European Powers*. European diplomacy and Europe's position in the world since 1870, with an introductory survey of diplomatic institutions since the Renaissance. Two courses. *W. Scott*

139, 140. *Nineteenth-Century Europe*. With special attention to Ger-

many and Austria-Hungary, this course emphasizes the development of European nationalism and the clash of freedom and authority. Two courses. *Hollyday*

141, 142. *History of China*. From early times; emphasis on modern transformations since the nineteenth century. Two courses. *Uhalley*

143, 144. *History of Modern Japan*. Japan from 1600 to the present; the transition from the traditional to the modern state. Two courses. *Silberman*

147. *History of India to 1707*. Early development, classical Hindu civilization, the impact of Islam, first modern contacts. One course. *Embree*

148. *History of India and Pakistan, 1707 to the Present*. Decay of the Mughal Empire, social and economic impact of Western rule, development of nationalism, independence and after. One course. *Embree*

149. *Military History*. War, politics, and technology. One course. *Ropp*

154, 155. *The History of the South*. A study, beginning in the colonial period, of the development of the southern part of the United States with particular attention to its distinctive characteristics and institutions and to their influence in shaping southern attitudes toward major questions of national policy. Two courses.

157, 158. *The Rise of Modern Science*. The development of science and medicine, with attention to cultural and social influences upon science. First semester: through Newton. Second semester: eighteenth to twentieth centuries. Two courses. *Mauskopf*

161, 162. *Russia from Ivan the Terrible to the Present*. Topics treated include the rise of the Russian state and its relations with Poland and Turkey; the agrarian problem and the rise of industry; the Russian Revolution; the political, agricultural, and industrial policies of the Soviet Union; the role of the U.S.S.R. in World War II; postwar policies. Two courses. *Dunn and Miller*

163, 164. *Reform and Politics in Nineteenth-Century America*. First semester: the coming of the Civil War, with emphasis on the reform movements of the Jackson era and anti-slavery crusade and national politics to 1865. Second semester: reform and politics from the Reconstruction era to the Farmers' Revolt of the 1890's. Two courses. *Durden*

167, 168. *Modern European Intellectual and Cultural History*. Leading European thinkers from the Enlightenment to the present. Two courses. *Parker*

199. *The Changing South*. (See Interdisciplinary Course 199.)

For Seniors and Graduates

Students may receive credit for either semester of a hyphenated course at the 200-level without taking the other semester if they obtain written

permission from the instructor and either the Director of Undergraduate Studies or the Director of Graduate Studies.

201-202. *The History of Russia, 1801-1917*. The development of the Russian Empire in its political, social, and economic aspects, and the growth of forces leading to its downfall. Two courses.

203-204. *The United States, 1850-1900*. The rise of sectionalism, secession, war-time problems of the Union and Confederacy, political and economic adjustments of Reconstruction, the status of the Negro, the New South, problems of capital and labor, the agrarian revolt, political parties and reform, the Spanish-American War. Two courses.

207-208. *American Urban History*. Two courses. A. Scott

211. *The United States and Latin America: A History of Inter-American Problems*. American intervention, anti-Americanism, the United States in Latin American writings, Pan-Hispanism, investment and expropriation, the Pan-American movement, and defense of the Hemisphere. One course. Lanning

212. *Recent Interpretations of United States History*. A course designed to encourage a critical evaluation of major issues in United States history through examination of recent interpretations of key problems. (Open only to history graduate students and seniors doing practice teaching in one of their final two semesters.) One course. Watson

213-214. *The Old South*. Political thought and party trends from Jefferson to Calhoun; agriculture, slavery, expansion; commerce, manufacturing, transportation; urban life, religion, education; the rise of southern nationalism. Two courses.

215-216. *The Diplomatic History of the United States*. Two courses. Davis

223-224. *The Old Regime and the French Revolution, 1661-1815*. A study of social, political, and intellectual revolutions in continental Europe, centering on France and giving special attention to successive interpretations of historical change. Two courses. Acomb

225, 226. *The Age of the Reformation*. Interaction of political and religious developments in sixteenth century Europe. Two courses. Hillerbrand

229. *Recent Interpretations of Modern European History*. A course designed to develop the ability to appraise critical historical issues through the study and discussion of recent interpretations of key historical problems in modern European history. (Open only to history graduate students and seniors doing practice teaching in one of their final two semesters.) One course. Parker

230. *History of Spain*. Late medieval period to the present. One course. TePaske

231-232. *The Hispanic Colonies and Republics in America*. First semester: the Spanish Conquest; the church, race, and society; universities,

medicine, and science. Second semester: the wars of independence, problems of land, education, and public health. Two courses. *Lanning*
233-234. *The Institutional, Cultural, and Social History of Hispanic America*. Two courses. *Lanning*

237-238. *Europe in the Middle Ages, 395-1500*. Two courses. *Young*
241-242. *Modernization and Revolution in China Since 1850*. Two courses. *Uhalley*

247. *History of Modern India and Pakistan, 1707-1857*. Analysis and interpretation, with special emphasis on social and economic change. One course. *Embree*

248. *History of Modern India and Pakistan, 1857 to the Present*. One course. *Embree*

249-250. *Social and Intellectual History of the United States*. The interplay of ideas and social practice through the examination of attitudes and institutions in such fields as science and technology, law, learning, and religion. Two courses. *Holley*

263-264. *American Colonial History and the Revolution, 1607-1789*. The founding and institutional development of the English colonies; the background, progress, and results of the Revolution. Two courses. *Alden*

265-266. *Modern South America*. Political, social, and economic history of the leading South American nations from the mid-nineteenth century to the present. Two courses. *TePaske*

267-268. *From Medieval to Early Modern England*. The intellectual, social, and political problems of transition to modern England, with special emphasis on the English Renaissance. Two courses. *Ferguson*

269. *British History from 1714 to 1867*. The Glorious Revolution, constitutional evolution, political methodology, Industrial Revolution, reforms, considered in context of the relationship of ideas and events. One course. *Hamilton*

270. *British History from Mid-Nineteenth Century*. Liberals and Conservatives, Irish Home Rule, the empire, wars and economic decline, the welfare state. One course. *Hamilton*

273, 274. *Topics in the History of Science*. Critical stages in the evolution of scientific thought. Two courses. *Mauskopf*

275-276. *Central Europe, 1849-1914*. Conflict between liberalism and authoritarianism, clash of nationalities, and domestic changes in Germany and Austria-Hungary. Two courses. *Hollyday*

277-278. *Reform and Politics in Nineteenth-Century U.S.A.* Two courses. *Durden*

281-282. *Development of Modern Medicine*. Two courses. *Brieger*

285. *Origins of Indian Civilization*. A study of the formation of the classical civilization of the Indian sub-continent from the prehistoric Indus Age to the Gupta Period (4th century A.D.). Attention will be given to the development of political, economic, social and religious

movements and institutions. (Listed also as Religion 285.) One course. *Sullivan*

287-288. *History of Modern Japan*. The political, economic and social development of Japan since 1750; factors contributing to Japan's emergence as a modern state. Two courses. *Silberman*

296. *Canada from the French Settlement*. Problems in the development of Canada and its provinces. One course. *Preston*

297. *The British Empire in the Nineteenth Century*. (From 1783). The development of the Empire from the American Revolution to the imperialism that culminated in the South African War. One course. *Preston*

298. *The Commonwealth in the Twentieth Century*. The origins and evolution of the Commonwealth of Nations and its adjustment in the age of anti-colonialism. One course. *Preston*

For other courses in Ancient History which may be taken for credit in History or Classical Studies, see Classical Studies 253—*Greece to the Orientalizing Period*; 254—*The Age of the Tyrants and the Persian Wars*; 255—*The Age of Pericles*; 256—*The Fourth Century through Alexander*.

Independent Study

191, 192. *Independent Study*. Directed reading and research. Admission will be subject to approval of the individual instructor and the department. Two courses. *Staff*

193, 194. *Independent Study*. Same as 191, 192, but for seniors. Two or four courses. *Staff*

Undergraduate Seminars

97-98. *Sophomore Seminar*. Open to sophomores on application to the Director of Undergraduate Studies and with permission of the instructor. Two courses.

The following seminars are designed to offer opportunities for reading and historical investigation in significant problems. Juniors as well as seniors may apply for admission to these courses, and are urged to do so if they expect to be candidates for Graduation with Distinction in History or if they expect to practice-teach in their senior year. All seminars are open to non-majors as well as to majors.

195A-196A. *Renaissance Intellectual History*. Studies in the transformation of European thought between 1300 and 1600. Two courses.

195B-196B. *Twentieth-Century Europe*. Two courses. *Colton and W. Scott*

195C-196C. *Problems in American Intellectual History*. (Students may not receive credit for this course and 249-250.) Two courses. *Holley*

- 195D-196D. *The Progressive Era Through the New Deal*. Two courses. Watson
- 195E-196E. *American History Before 1789*. Two courses. Alden
- 195F-196F. *Problems in Nineteenth-Century American Reform and Politics*. (Students may not receive credit for this course and 163-164.) Two courses. Durden
- 195G-196G. *Nationalism and Communism in the Far East*. Two courses. Uhalley
- 195H-196H. *From Rural to Urban Society in the United States*. Two courses. A. Scott
- 195I-196I. *Nationalism and Freedom in Nineteenth-Century Europe*. Two courses. Hollyday
- 195J-196J. *Studies in the History of Socialism and Communism*. Two courses. Lerner
- 195K-196K. *European Expansion and Imperialism*. Two courses. Cell
- 195L-196L. *Europe in the Age of the Reformation, 1500-1650*. Two courses. Hillerbrand
- 195N-196N. *The English Renaissance*. Two courses. Ferguson
- 195Q-196Q. *Class and Social Mobility in English History*. Two courses. Ginter
- 195R-196R. *The Age of Newton*. Two courses. Mauskopf
- 195S-196S. *Processes of Development in Modern Japan, 1800 to the Present*. Two courses. Silberman
- 195T-196T. *Problems in the History of Russia Before 1917*. Two courses.
- 195U-196U. *Social Conflict and Political Parties from Jackson to Grant*. Two courses. Nathans
- 196.99. *History Honors Pro-Seminar*. Required in the spring semester of juniors selected for the Senior Honors Seminar of the following year. Conferences on selection of research topics and research techniques. Half-course. Holley and Parker
- 197-198. *Senior Honors Seminar*. A course designed to introduce qualified students to advanced methods of historical research and writing and to the appraisal of critical historical issues. Open only to seniors, but not restricted to candidates for degree with distinction. This course, when taken by a history major, would be in addition to the two courses required in 195-196 seminars or 200-level courses of the History Department. Two courses. Holley and Parker

Departmental Major

Prerequisite. Two introductory courses in history (1D-2D, 1S-2S, 51-52, 53-54, 61D-62D, 91-92).

Major Requirements. Students desiring to take a major in history are

required to elect, in addition to the two prerequisite courses, six courses in the department, including two courses in either an undergraduate seminar (195-196) or any two courses on the 200-level. Students wishing to take the more advanced courses in American history are advised to elect History 91-92 in the sophomore or junior year.

Honors. Any student who is qualified (see the section on Honors in this *Bulletin* for general requirements) may undertake work leading to a degree with distinction in history by presenting himself to his history faculty adviser as a candidate. Normally, honors work involves participation in one of the undergraduate seminars during the junior year and selection for the Senior Honors Seminar in the senior year. Further information is available at the History Department office, 236 Allen, West Campus, or 102 West Duke Bldg., East Campus.

Courses Approved for Related Work in History

Anthropology.

Art. History of Art.

Economics.

Education. 113, 207, 225.

English and American Literature.

German, Greek, Latin, Russian, and the Romance Languages. The literature courses that are not primarily conversation or composition.

Greek, Latin. Except those courses that are primarily grammar or composition.

Interdisciplinary. 101, 102, 199.

Linguistics. 101.

Music. History of Music.

Philosophy. Except 48.

Political Science.

Psychology. 92, 93, 94, 101. And other courses if specifically approved.

Religion. Especially those numbered above 100.

Sociology.

Interdisciplinary Courses

The following are cooperative courses offered by the departments concerned. Where a department accepts the course for the major, the same number is used as a departmental offering. Certain other departments accept these courses as related work.

101, 102. *Introduction to the Civilizations of Southern Asia.* Hindu, Islamic, and Buddhist foundations, impact of the West, and emergence of the modern nation-states of Southern Asia. The first semester will analyze traditional Hindu civilization and the Islamic impact on South-

ern Asia. The second semester will examine Western influences and the development of modern societies and states in Southern Asia. Two courses. *Apte, Braibanti, Embree, Fox, McCormack, Spengler, and Tangri*

199. *The Changing South*. A survey of the geography, demography, economics, politics and culture of the South. (See the Departments of Anthropology, Economics, History, Political Science, Sociology.) One course.

Italian

For courses offered in Italian, see *Romance Languages*.

Latin

For courses offered in Latin, see *Classical Studies*.

Linguistics

The courses in Linguistics may be taken as electives by advanced students; certain courses serve as related work in several departments (see the entries for related work under the separate departments).

No major is offered in Linguistics. Students interested in the study of language as a part of their undergraduate program or as a preparation for graduate work in linguistics should consult the instructors of the courses listed below.

101. *Introduction to Linguistics*. Origin and nature of language, methods of descriptive linguistics with reference to historical and comparative linguistics. No specific prerequisite except sophomore standing. One course. *Baylis and Apte*

For a description of the following courses consult the listings under the specified department.

<i>Language and Society</i> (Anthropology 238)	<i>Apte</i>
<i>Linguistic Anthropology</i> (Anthropology 260, 261)	<i>Apte</i>
<i>Development of the English Language</i> (English 108)	<i>Bowman</i>
<i>Modern English Grammar</i> (English 109)	<i>Butters</i>
<i>Old English Grammar and Readings</i> (English 207)	<i>Nygard</i>
<i>History of the English Language</i> (English 208)	<i>Nygard</i>
<i>Old French Literature</i> (French 219)	<i>Vincent</i>
<i>Dutch</i> (German 181, 182)	<i>Stern</i>
<i>Middle High German</i> (German 205, 206)	<i>Stern</i>

History of the German Language (German 216) Stern
Symbolic Logic (Philosophy 103) Staff
Philosophy of Language (Philosophy 109) Welsh
Romance Linguistics (Romance Languages 224) Hull
Old Spanish Languages. (Spanish 257) Davis

Management Sciences

Professor Volpp, *Chairman*; Professor Dickens, *Director of Undergraduate Studies*; Professors Black, Joerg, and Keller; Associate Professors Baligh, Dellinger, and Pondy

The courses offered by the Department of Management Sciences stress conceptual understanding of, and analytical reasoning related to, problems of modern management, and the relationship between the performance of complex organizations and the society in which they operate.

50P. *Elementary Theory of Economic Enterprise*. Analysis of the internal resource allocation problem of the enterprise, of market structures, and the relationship between the two. Topics include marginal analysis, theories of competitive market structures, and introduction to special problems of finance, marketing, and production. Prerequisite or corequisite: Math 32. One course.

60D. *Probability and Statistics for Decision Problems*. Fundamentals of probability theory, classical and Bayesian statistical analysis, and elementary decision theory. The application of statistical analysis to decision problems is stressed. Topics include sample spaces, probability distributions, combinations and permutations, functions of random variables, Bayes Theorem, Central Limit Theorem, estimation, analysis of variance, regression and correlation analysis, utility, risk, uncertainty, and decision criteria. Prerequisite or corequisite: Math 68. One course.

120D. *Organization Theory*. Introduction to recent theories of and research on the structure and behavior of complex organizations, with special reference to business firms. Topics to be covered include: rationality, authority, bureaucracy, and other concepts; power, decision-making, informal organization, organization change, and other internal process phenomena; effects of technology, culture, and other environmental influences; brief consideration of organization design. Prerequisite: Management Sciences 50, 60. One course.

130D. *Information Systems*. An analysis of the data needed for economic decisions relating to business enterprises and of the systems used in accumulating, analyzing, interpreting, and presenting the data to various users. Financial reporting to external users and managerial use

of information for decision-making are stressed. Prerequisite: Management Sciences 50, 60. One course.

140D. *Operations Research*. Introduction to the use of mathematical models in the analysis of decision problems. Topics include mathematical programming, game theory, dynamic programming, queuing theory, simulation, and inventory models. Use of electronic computer will be included. Prerequisite: Management Sciences 50, 60; corequisite: Math 51. One course.

191, 192. *Independent Study*. Directed reading and research. Approval of the instructor and the Director of Undergraduate Studies required.

193, 194. *Independent Study*. Same as 191, 192 but for seniors.

210S. *Intermediate Theory of Economic Enterprise*. Introduction to competitive market strategies and cooperating decisions and analysis of the efficiency and equilibrium of market structures. Emphasis is on the effects of the economic environment on the decision of the enterprise, and conversely. Prerequisite: Management Sciences 120, 130, and 140. One course.

211S. *Finance*. An analysis of the problems of management of the financial affairs of the firm with particular attention to the long term capital needs and the development of an optimal capital structure. Prerequisite: Management Sciences 210. One course.

213S. *Marketing*. An examination of public policy and the marketing behavior of private enterprise and the creation of a marketing program for the firm. Prerequisite: Management Sciences 210. One course.

215S. *Production*. An economic and social analysis of the problems of designing a production system for an organization, of operating within the constraints of a given production system, and of the interactions between a production system and other components of the organization and with society. Prerequisite: Management Sciences 210. One course.

220S. *Advanced Organization Theory*. Continuation of M.S. 120S, but with extension to non-market organizations such as labor unions, universities, hospitals, and governmental units. Special emphasis will be placed on the following topics: development and testing of mathematical models of organization; optimum organization design; treatment of organization as political coalitions, using game theoretic concepts; consideration of the social choice question. Prerequisite: Management Sciences 210. One course.

230S. *Controllershship*. An analysis of the use of accounting information in the planning, control, and decision-making process in the business enterprise. Topics include methods of cost accumulation, development of standards, the basic patterns of cost behavior, budgeting techniques for aiding long-range planning and the making of specific decisions. Prerequisite: Management Sciences 210. One course.

231S. *Financial Accounting*. An in-depth analysis of the requirements of outsiders (investors, auditors, unions, and governments) for informa-

tion about the status and operations of firms and a framework for disclosure of the relevant data. Prerequisite: Management Sciences 210. One course.

232S. *Internal Control and Auditing*. An analysis of the accounting control system and the independent auditor's examination of that system and other evidence as a basis for expressing an opinion on a client's financial statements. Topics include basic audit objectives, standards, ethics, terminology, procedures and report. Prerequisite: Management Sciences 230 and 231. One course.

233S. *Federal Income Taxation*. A study of the principles of federal income tax laws as related to corporations and individuals. Tax planning and the effect of tax law on business decisions will be emphasized. Prerequisite: Management Sciences 210. One course.

234, 235, 236. *CPA Preparation*. The purpose of this course is to review and update the material studied in prior accounting and legal courses and supplementary material which is considered especially pertinent to those students planning to sit for the Certified Public Accountants' Examination upon completion of their undergraduate education. Prerequisite: Management Sciences 230 and 231. (Those who do not wish credit may take M.S. 234, 236 for \$34.00 per semester.) One course each.

240S. *Advanced Operation Research*. The application of operations research methodology to real world problems. Special emphasis will be placed on problem formulation, model-building, model validation and evaluation, sensitivity analysis, interpretation of results, and implementation. Prerequisite: Management Sciences 210. One course.

241S. *Decision Theory*. A study of the structure of decision problems arising in the operation of an organization, alternative decision criteria, and the development of decision rules for rational behavior. Included will be an investigation of decision-making under certainty, risk, and uncertainty, decision-making in competitive situations, and the cost and value of information. Prerequisite: Management Sciences 210. One course.

289S. *Research Methodology*. Philosophy and logic of research in the social sciences (nature of explanation; normative and positive theories; functional, rational, and conflict models); theory development and model construction (including attention to testability of inferences, problems of identification, etc.); experimental design, data collection, and data analysis (including attention to problems of uncontrolled experiments, sampling theory, comparison of case studies, survey research, field experiments, use of published data). Prerequisite for Management Sciences majors: Management Sciences 120, 130, and 140. For non-business majors: one semester of statistics, computer programming, one upper-level mathematics course, and at least three social science courses beyond the introductory level. One course.

Departmental Major

The Department of Management Sciences offers specialization in two areas—accounting and management science. Each program requires that the student take the same prerequisite courses.

Prerequisites and Corequisites required of all majors in the department. Mathematics 31, 32, 51, 68.

Required courses. Management Sciences 50, 60, 120, 130, 140, and 210, plus one elective. The additional work required for specialization in accounting includes Management Sciences 230, 231, 232, and 233.

Mathematics

Professor Warner, *Chairman*; Professor Dressel, *Director of Undergraduate Studies*; Associate Professor Reynolds, *Supervisor of Freshman Instruction*; Professors Carlitz, Gallie, Murray, Roberts, Shoenfield, Weisfeld, and Woodbury; Adjunct Professor Sewell, Associate Professors Bryson, Burdick, Burlak, Kitchen, Patrick, Smith, and Stackelberg; Assistant Professors Caviness, Dankel, Henson, Herr, Hodel, Moore, O'Fallon, O'Neill, Scoville, Shauck, and Wilkinson; Instructors Katz, Schorr, Smith, and Stubbs; Visiting Instructor (Part-Time) Schroeder

The following program of courses in mathematics is planned for 1970-71.

Fall. 31, 32, 51, 73, 112, 113, 131, 133, 135, 139, 152, 171, 217, 221, 235, 247, 271, 275, 283, 284, 285, 287, 289, 291.

Spring. 31, 32, 51, 73, 74, 111, 114, 126, 128, 131, 133, 136, 140, 152, 181, 204, 218, 222, 236, 244, 248, 272, 276, 286, 288, 290, 292, 293.

17. *Introduction to Finite Mathematics.* A course designed to introduce students to some of the concepts in modern mathematics. Elementary logic, sets and subsets, vectors and matrices, and probability theory are studied. Some applications of these topics to the biological, social, and physical sciences are considered. Prerequisite: three units of college preparatory mathematics. One course. *Staff*

21, 22. *Introductory Calculus.* Real numbers, rectangular and polar coordinates, trigonometric and inverse trigonometric functions, logarithmic and exponential functions, conic sections, vectors, limits, derivatives, maxima and minima, methods of integration, areas, volumes, moments, centroids, indeterminate forms, improper integrals. Prerequisite: three units of college preparatory mathematics. Mathematics 21 is prerequisite for Mathematics 22. Two courses. *Staff*

31, 32. *Introductory Mathematical Analysis.* Language of logic and sets, elementary and transcendental functions, continuity, differentiation, integration, the fundamental theorem of the calculus, sequences, series, Taylor's formula. Prerequisite: three units of college preparatory mathe-

matics. Mathematics 31 is prerequisite to Mathematics 32. Two courses. *Staff*

51. *Introduction to Digital Computation*. Flow charts; binary arithmetic; an assembly language; program structures, subroutines, linkages, recursion; data structures, arrays, polynomials; an algorithmic language; differential linear algebra, matrix inversion, linear programming, estimation of parameters by criteria of Gauss and Chebyshev. (A fee of \$8.00 is charged for this course.) Prerequisite: three units of college preparatory mathematics. One course. *Gallie*

63. *Intermediate Calculus*. Taylor's formula, infinite series, partial derivatives, solid analytic geometry with vectors, functions of several variables, multiple integrals. Prerequisite: Mathematics 22. One course. *Staff*

68. *Introduction to Linear Algebra*. A basic course in the geometry of vectors in Euclidean n -space, real vector spaces, simultaneous equations, linear transformations and matrix representation, elementary row operations, equivalence and similarity of matrices, determinants, and quadratic forms. Prerequisite: Mathematics 17 or 21. One course. *Staff*

73, 74. *Linear Algebra and Intermediate Mathematical Analysis*. Real and complex vector spaces, linear transformations and matrix representations, similarity of matrices, determinants, quadratic forms, partial differentiation, functions defined implicitly, multiple integrals, infinite series, linear differential equations. Prerequisite: Mathematics 32 for 73, and Mathematics 73 for 74. Two courses. *Staff*

111. *Applied Mathematical Analysis I*. Ordinary and partial linear differential equations with constant coefficients, Fourier series and their applications, vectors. Not open to students who have had Mathematics 131. Prerequisite: Mathematics 63 or 74. One course. *Staff*

112. *Applied Mathematical Analysis II*. Complex variables, residues, conformal mapping, matrices, Laplace and Fourier Transforms and their applications. Prerequisite: Mathematics 63 or 74. One course. *Staff*

113, 114. *Modern Algebra*. Vector spaces, linear transformations, matrices, elementary theory of groups, rings, and fields. Prerequisite: Mathematics 68 or 73 for 113; and 113 for 114. Two courses. *Staff*

126. *Introduction to Linear Programming and Game Theory*. Fundamental properties of linear programs; linear inequalities and convex sets; primal simplex method; duality; two person and matrix games; integer programming. Prerequisites: Mathematics 22 and 68 or 73 or consent of the instructor. One course. *Staff*

128. *Number Theory*. Divisibility properties of integers; prime numbers; congruences; quadratic reciprocity; number-theoretic functions; simple continued fractions; rational approximations. Prerequisite: Mathematics 63 or 74 or permission of instructor. One course. *Staff*

131. *Elementary Differential Equations*. Solution of differential equations of elementary types; formation and integration of equations arising

in applications. Not open to students who have had Mathematics 111. Prerequisite: Mathematics 63 or 74. One course. *Staff*

133. *Basic Statistics*. Principal statistical methods including application to psychological, economic, business administration, and educational problems. Techniques of data collection and presentation, hypothesis testing, using the chi-square, t, and F distributions, interval estimation, and linear regression. Not open to students who have had Economics 138 or Psychology 117. One course. *Burdick*

135, 136. *Probability and Statistics*. Permutations and combinations, total and compound probability, Bayes' formula, Bernoulli's theorem, discrete distributions, central values, moments and mathematical expectation, law of large numbers, probabilities in continuum, continuous distributions, sampling distributions, confidence limits, tests of hypotheses, and analysis of variance. Prerequisite: Mathematics 63 or 74 for 135; 68 or 74 and 135 for 136. Two courses. *Burdick*

139, 140. *Advanced Calculus*. Multiple integrals and Jacobians, infinite series, power series, differential equations, vector analysis, line and surface integrals, Green's theorem, Stoke's theorem, improper integrals. Prerequisite: Mathematics 63 or 74 for 139; and 139 for 140. Two courses. *Staff*

141, 142. *Junior Mathematics Seminar*. An honors course designed to coordinate and advance the mathematical knowledge of students who have demonstrated marked proficiency in mathematics and who desire intensive and rigorous work in this subject. Student reports will be required. Prerequisite: Mathematics 68 or 74 for 141; and 141 for 142; or permission of Director of Undergraduate Studies. Two courses. *Staff*

152. *Non-numerical Computation*. List and string processing languages, symbolic mathematics, mechanical game playing, Turing machines, algorithms, recursive undecidability, artificial languages, compilers. Prerequisites: Math 22 or 32, 51 and 68 or 74; or consent of the instructor. One course. *Caviness*

171. *Elementary Topology*. Basic set theory; metric spaces; topological spaces; continuity; basic topological properties including compactness and connectedness. Prerequisite: Mathematics 63 or 74. One course. *Staff*

181. *Complex Analysis*. Complex numbers, analytic functions, complex integration, Cauchy's theorem, Taylor and Laurent series, theory of residues, argument and maximum principles, conformal mapping. Prerequisite: Mathematics 63 or 74. One course. *Staff*

187. *Introduction to Mathematical Logic*. Propositional calculus, predicate calculus, Gödel completeness theorem, applications to formal number theory, incompleteness theorem, additional topics in proof theory or computability. Prerequisites: Mathematics 63 and 68, or 74, or Philosophy 103. One course. *Henson*

191, 192. *Independent Study*. Directed reading and research. Open to highly qualified juniors and seniors. Two courses. *Staff*

For Seniors and Graduates

204. *Geometry for Teachers*. Metric and synthetic approaches to plane and solid geometry; affine geometry; and algebraic model of Euclidean geometry. One course. *Reynolds*

217, 218. *Intermediate Analysis*. Real and complex number systems, sequences and series, continuity, differentiation, integration. Prerequisite: Mathematics 63 or 74 for 217; and 217 for 218. Two courses. *Kitchen*

221, 222. *Numerical Analysis*. Numerical calculus, solution of ordinary and partial differential equations, solution of systems of linear and non-linear algebraic equations, eigenvalue problems, linear programming and least squares techniques. Prerequisite: A knowledge of computer programming and Mathematics 63 or 74 for 221, and 221 for 222. Two courses. *Patrick*

227, 228. *Theory of Numbers*. Congruences, arithmetic functions, compound moduli, quadratic reciprocity, Gauss sums, quadratic forms, sums of squares. Prerequisite: Mathematics 63 or 74 for 227; and 227 for 228. Two courses. *Carlitz*

229, 230. *Algebraic Numbers*. Ideals, unique factorization, divisors of the discriminant, determination of the class number. Prerequisite: Mathematics 113 for 229; and 229 for 230. Two courses. *Carlitz*

234. *Sample Designs*. Methods of constructing and analyzing survey designs; elements of simple random sampling, stratified sampling, multi-stage sampling; methods of estimation; questionnaire construction; refusals and not-at-homes. Prerequisite: Mathematics 133. One course. *Bryson*

235, 236. *Abstract Algebra*. Groups, rings, fields, vector spaces, polynomials, Galois theory, linear operators, inner product spaces. Prerequisite: Mathematics 114 for 235; and 235 for 236. Two courses. *Scoville*

244. *Design of Experiments*. Methods of constructing and analyzing designs for experimental investigation, Latin square, split-plot, simple and partially confounded factorial designs, incomplete block designs, treatment of missing data, techniques of experimentation. Prerequisite: Mathematics 133. One course. *Burdick*

245, 246. *Combinatorial Analysis*. Generating functions, distributions, partitions, compositions, trees, and networks. Prerequisite: Calculus. Two courses. *Carlitz*

247, 248. *Arithmetic of Polynomials*. Field theory, detailed study of finite fields, special polynomials and functions, valuation theory, the zeta function. Prerequisite: Mathematics 235 or consent of the instructor for 247; and 247 for 248. Two courses. *Carlitz*

262. *Non-Parametric Statistics*. A study of statistical tests in which no assumption about the underlying distribution is made; single and multiple sample tests for nominal and ordinal scales; non-parametric measures of correlation, efficiency of tests. Prerequisite: Mathematics 244, or consent of the instructor. One course. *Bryson*

271, 272. *Introductory Topology*. Basic topological properties, including separation axioms, compactness, and connectedness; metric spaces; product spaces; function spaces; uniform spaces. Prerequisite: calculus. Two courses. *Hodel*

273, 274. *Algebraic Topology*. Homology and cohomology theories; complexes; introduction to homotopy groups, Čech homology theory. Prerequisite: Mathematics 272. Two courses. *Staff*

275, 276. *Probability*. Foundations of probability; random variables; distributions; central limit problem; law of large numbers; limit and ergodic theorems. Prerequisite: Mathematics 135; or calculus and consent of the instructor. Two courses. *Wilkinson*

283. *Applied Mathematical Statistics*. Basic probability concepts, the sample space, discrete and continuous events, permutations and combinations, conditional and marginal probability, discrete and continuous distributions, expected values and moments, sampling distributions, estimation, hypothesis testing, confidence intervals, basic queueing theory. Prerequisite: Mathematics 63 or 74. One course. *Herr*

284. *Least Squares Analysis of Linear Models*. General linear models; geometrical interpretations; multiple regression; one-way and multi-way analysis of variance; fixed, random, and mixed models; experimental design models; analysis of covariance; introduction to non-linear models. Prerequisite: Mathematics 136 or 283. One course. *Burdick*

285. *Applied Mathematical Methods I*. Vectors, line and surface integrals, tensors, complex variables, differential and integral equations. Prerequisite: Mathematics 63 or 74. One course. *Dankel and Dressel*

286. *Applied Mathematical Methods II*. Wave equation, Fourier series, heat equation, telegraphic equations, Legendre polynomials, Bessel functions, Schrödinger's equation. Prerequisite: Mathematics 63 or 74. One course. *Dankel and Dressel*

287, 288. *Foundations of Mathematics*. Propositional calculus, predicate calculus, axiomatized number theory. Gödel completeness and incompleteness theorems. Recursive functions; hierarchies; constructive ordinals. Set theory; consistency of the axiom of choice. Prerequisite: Mathematics 114 or Philosophy 103, or consent of the instructor. Two courses. *Henson*

289. *Applications of Stochastic Processes I*. Recurrent events, random walk, Markov chains and processes, queueing theory, branching and diffusion processes. Prerequisite: Mathematics 135 and 140, or consent of the instructor. One course. *Wilkinson*

290. *Applications of Stochastic Processes II*. Linear operators, spectral

representations, time series, multivariate analysis, auto-regressive schemes, Gaussian processes, cross-correlation functions, smoothing, filtering, prediction, Wiener-Hopf equation, diffusion processes, Fokker-Planck equation, first-passage times. Prerequisite: Mathematics 289 or consent of the instructor. One course. *Wilkinson*

291, 292. *Analysis I, II*. Theory of Analytic Functions, measure and integration theory, introduction to functional analysis. Prerequisite: Mathematics 218 or 140, or consent of the instructor. Two courses. *O'Neill*

293. *Multivariate Statistics*. Basic multinormal distribution theory, the multivariate general linear model including the use of Hotelling's T^2 statistic and the Roy union-intersection principle, principal components, canonical analysis, and factor analysis. Prerequisite: Mathematics 284, or consent of the instructor. One course. *O'Fallon*

295. *Mathematical Foundations of Statistical Inference*. Inference-theoretic approach to hypothesis testing, decision making, and estimation; Neyman-Pearson fundamental lemma; uniformly most powerful tests; Fisher's information and sufficiency; invariance and unbiasedness. Prerequisite: Mathematics 275, or consent of the instructor. One course. *Herr*

297, 298. *Axiomatic Set Theory*. Statement and development of Zermelo-Fraenkel axioms. Consistency and independence problems. New axioms and their consequences. Prerequisite: consent of the instructor. Two courses. *Shoenfeld*

Departmental Major

For students entering before the school year 1969-70.

For the A.B. degree:

Prerequisites: Mathematics 21, 22.

Major and Related Work: 14 courses.

Major Requirements: Mathematics 63, 68, and six courses in mathematics numbered above 100, exclusive of Mathematics 133.

Related Work: Six to eight courses from the following departments: Chemistry, Economics and Management Sciences, Philosophy, Physics. Two courses above the introductory level must be taken in at least one of these departments.

For the B.S. degree:

Prerequisites: Mathematics 21, 22.

Major and Related Work: 16 courses.

Major Requirements: Mathematics 63, 68, and six courses in mathematics numbered above 100, exclusive of Mathematics 133.

Related Work: Six to eight courses in the natural sciences. Two

courses above the introductory level must be taken in at least one of these departments.

For students entering school year 1969-70, the department will offer only the A.B. degree.

Prerequisites: Mathematics 31, 32.

Major Requirement: Mathematics 73, 74 and six courses in mathematics numbered above 100 (excluding Mathematics 133, 244) which must include one of the following year sequences: Mathematics 113, 114, Mathematics 139, 140, or Mathematics 217, 218.

It is recommended that all majors take a one year sequence in a natural science other than mathematics. For a student considering graduate study in mathematics a reading knowledge of two foreign languages (usually French, German, or Russian) is extremely desirable.

Medical Science

This course in medical science has been approved by the Undergraduate Faculty Council as appropriate for the bachelor's degree.

M 151. *Anatomy of the Lower Extremities as it Relates to Locomotion.* Dissection of the human adult lower extremity. Demonstration and discussion of gait, biomechanics and kinesiology. One course. *Bassett*

Music

Professor J. Mueller, *Chairman*; Associate Professor E. Saville, *Director of Undergraduate Studies*; Associate Professor P. Bryan, *Supervisor of Freshman Instruction*; Professors Bone, Hamilton, and Hanks; Associate Professors Earls, W. Kirkendale, and Withers; Resident Artist Ciompi; Assistant Professors L. DiCecco, Henry, and Smith; Instructor Talbot; Staff Associates Crittenden, A. DiCecco, McCall, R. Phelps, Redding, Ritchie, and Young

Theory and Composition

5-6. *Basic Skills.* (Formerly laboratory sections of Music 65.) Development of aural perception of melodic, rhythmic, harmonic, and formal procedures of tonal music applied to keyboard. Half-course each semester. (Skill course—not applied to distributional requirements.) *Staff*

15. *Fundamentals of Music.* (Formerly lecture section of Music 65.) Physical properties of sound; basic principles of diatonic tonality. One course. (Skill course—not applied to distributional requirements.) *Bryan and Young*

67S, 68S. *Composition I.* Composing original music in the smaller

forms for voice, piano, and other instruments. Studies in contemporary compositional techniques. Prerequisite: Music 15 or 76 or consent of instructor. Two half-courses. *Earls and Hamilton*

76D. *Tonal Harmony*. (Formerly Music 66.) Harmonic language of eighteenth and nineteenth century classicism, including functional chromaticism, sectional forms. One course. Prerequisite: Music 15 or equivalent. *Earls*

77D. *Modal Counterpoint*. (Formerly Music 115.) Polyphonic, contrapuntal, and melodic practices found in the sacred and secular works of the sixteenth and seventeenth centuries. Prerequisite: Music 15 or equivalent. One course. *Earls*

116S. *Linear Tonal Practice*. Organic tonal elements (including canon, invention, chorale prelude, fugue) as found in the works of Bach, Mozart, Haydn, Beethoven, and Brahms. Prerequisite: Music 76, 77. One course. *Earls*

117S, 118S. *Music Theory III: Composition and Analysis*. The development of technical and expressive means in various media and styles. The completion of an original work in an instrumental or choral medium. Prerequisite: Music 116, 139, 158, or consent of instructor. Two courses. *Hamilton*

122. *Orchestration*. The technical characteristics and transpositions of the instruments of the modern symphony orchestra and concert band. Instrumentation of piano scores of original compositions for string, woodwind, brass ensembles. Prerequisite: Music 116. One course. *Bryan and Earls*

History and Literature

51-52. *Introduction to Music Literature*. The literature of music of Western civilization; acquisition of critical insights into musical styles, forms and techniques. Representative works of major composers in all media, instrumental and vocal. Two courses. *Staff*

51P-52P. *Preceptorial*. Weekly preceptorials.

125. *Masterworks of Music Literature*. An intensive study of selected masterworks which represent the principal currents in modern music history. Compositions by Bach, Mozart, Beethoven, Brahms, Debussy, and Bartok will constitute a frame of reference for historical, biographical, and stylistic analysis. One course. *Bone, Hamilton, and Mueller*

139. *Twentieth-Century Music*. Influential creative stylistic developments in music of the present century. A critical survey of works by Bartok, Berg, Schonberg, Stravinsky, and Webern as a means of establishing a relative standard of values for subsequent independent exploration. Prerequisite: a one-year course in music theory or literature, or consent of the instructor. One course. *Hamilton*

156S. *Music History I: History of Music from 1600 to 1750*. Prerequisite: Music 5-6, 15, or consent of instructor. One course. *Saville*

157S. *Music History II: History of Music from 1750 to 1830*. Prerequisite: Music 5-6, 15, or consent of instructor. One course. *Bryan*

158S. *Music History III: History of Music from 1830-1910*. Prerequisite: Music 5-6, 15, or consent of instructor. One course. *Hamilton*

159S. *Music History IV: History of Music to 1600*. Prerequisite: Music 5-6, 15 and two courses in music history, or consent of the instructor. One course. *Kirkendale*

163. *Music in the Eighteenth Century*. The development of important instrumental and vocal media and formal concepts through study of the music, the musicians, and their environment. One course. *Bryan*

164. *Music in the Nineteenth Century*. The interaction of musical, artistic, and literary movements in the cultural life of the century. One course. *Mueller*

165. *Opera Literature*. From the Florentine Camerata to the present. The operatic idea, with attention to changing relationships of music and text; opera as social commentary; formal and stylistic means. Selected composers from Monteverdi to Berg. One course. *Saville*

166S. *The Renaissance Madrigal*. History of Italian and English madrigal forms from the fourteenth century Ars Nova through the Renaissance into the early Baroque of the 1620's. Ability to read music and some experience with Italian helpful but not required. One course. *Saville*

173. *World Music*. Musical cultures of the world, emphasis on non-Western music, especially the art music of the Far East, Southeast Asia, the Near and Middle East; folk music of selected areas. One course. *Earls*

Independent Study and Senior Seminar

Admission to these courses will be subject to approval of the Director of Undergraduate Studies of the Department of Music and the individual instructor. The instructor as well as the course content will be established in accordance with the individual student's interests and capacities.

The department offers work leading to Graduation with Distinction. See the sections on Academic Honors and Special Curricular Programs on pages 58 and 68.

181, 182. *Independent Study in Musical Performance*. Open only to juniors possessing an exceptional technical and interpretive command of a musical medium. Prerequisite: Music 47, 48, 97, 98 or equivalent; audition and permission of instructor. One or two courses. *Staff*

183, 184. *Independent Study in Musical Performance*. Same as 181, 182, but for seniors. One or two courses. *Staff*

191, 192. *Independent Study*. Directed reading, research, and musical analysis within a prescribed area of musical literature. Open only to

highly qualified students in the junior year, by permission of the department. One or two courses. *Staff*

193,194. *Independent Study*. Same as 191, 192, but for seniors. One or two courses. *Staff*

195,196. *Senior Seminar in Music*. Guidance in the sources and materials of music and in the methods of stylistic analysis and criticism. A background of historical, stylistic, and theoretical knowledge is essential. Formal papers will be required. Open only to seniors, but not restricted to candidates for degree with distinction. Two courses. *Staff*

Music Education and Pedagogy

57-58. *Vocal Diction*. Problems of diction as specifically applied to the art of singing. Required of all applied voice majors. Half-course for two semesters work. *Hanks*

121. *Conducting*. The conducting of orchestral and vocal scores. Score-reading and analysis, principles of interpretation, establishment of vocal and instrumental conductorial techniques leading to practical experience in conducting the department musical organizations in rehearsal. Prerequisite: Music 76, 77, 116, or consent of instructor. One course. *Bone*

145-146. *Techniques of Keyboard Ensemble and Accompanying*. A performance-oriented survey of the ensemble and accompaniment literature. Prepared assignments, sightreading, and studio work with singers and instrumentalists. Prerequisite: a working level of keyboard efficiency. Audition required. Two half-courses. *Talbot*

151. *Public School Music Education (Elementary)*. Development of the child through music. Child voice and song literature; rhythmic activities; learning to listen; use of elementary instruments such as the autoharp, psaltery, bells, rhythm band instruments. Both group and individual help in elementary music theory; music reading exercises; chording and improvising piano accompaniments; conducting; construction of rhythm band scores. Integration of music with other activities, such as planning music for social studies units. Half-course. *McCall*

152. *Public School Music Literature (Elementary)*. A study and analysis of key works in the symphonic, pianistic, and vocal repertoire which are particularly applicable to the teaching of music appreciation as a cultural aspect of social studies in the public school. Half-course. *McCall*

153. *Vocal Music in the Public School (Secondary)*. Repertoire and methods for teaching vocal music in the junior and senior high schools. Aims, organization, administration, training, and performance of school choirs and ensembles; care of the changing voice. One course. *Saville*

154. *Instrumental Music in the Public School (Secondary)*. Materials and methods of teaching instrumental music in the junior and senior high

schools; emphasis on teaching technics, repertoire, organization, and administration of the instrumental curriculum. One course. *Bone*

Applied Music

The study of applied music concerns the understanding of music literature through performance. Instruction is offered in the following media: (a) Piano; (b) Strings; (c) Woodwinds; (d) Brass; (e) Voice; (f) Ensemble—Instrumental, Piano, Vocal coaching and performance; participation through one of the departmental ensembles listed at close of the music section; and (g) Organ. Instruction in media *a* through *e* may be private or in classes limited to a minimum of four and a maximum of seven students. Class instruction is restricted to the first four grades of proficiency. Class instruction shall be designated by adding the letter *x* to the appropriate medium and year-in-school classification. (Example: junior year, Woodwinds, class instruction is recorded 147CX.)

Students must arrange an audition with the instructor prior to registration in Applied Music courses. The course numbers listed below refer to the student's class standing and not his musical proficiency.

Piano. 47A-48A, 97A-98A, 147A-148A, 197A-198A. Half-course or one course per year. *Withers, Phelps, Talbot, and Young*

Violin, Viola, Cello. 47B-48B, 97B-98B, 147B-148B, 197B-198B. Half-course or one course per year. *Ciampi, DeCecco, and J. Mueller*

Woodwinds. 47C-48C, 97C-98C, 147C-148C, 197C-198C. Half-course or one course per year. *Henry*

Brass. 47D-48D, 97D-98D, 147D-148D, 197D-198D. Half-course or one course per year. *Bryan*

Voice. 47E-48E, 97E-98E, 147E-148E, 197E-198E. Half-course or one course per year. *Hanks and Redding*

Ensemble. 47F-48F, 97F-98F, 147F-148F, 197F-198F. Half-course or one course per year. *Staff*

Organ. 47G-48G, 97G-98G, 147G-148G, 197G-198G. Half-course or one course per year. *Ritchie and Crittenden*

Credit in Applied Music. (Skill courses—credit not applicable to distributional requirements.) Credit for instruction in media *A, B, C, D, E,* and *G* is granted on the basis of a half-course per semester for one hour of private instruction per week and a minimum of six hours practice weekly; or a half-course per year for one-half hour of private instruction, or one period of class study, and a minimum of six hours practice per week. An additional weekly class meeting for performance and criticism may be required by the instructor without additional credit. Credit for instruction in medium *F* is granted on the basis of a half-course per year for one rehearsal period of instruction and a minimum of three hours practice per week. Students other than music majors may receive not more than two course credits for work in applied music.

Fees. Upper class students who have been accepted as music majors at the time of registration for applied music courses are exempt from paying the applied music fees. Other students are charged for all applied music media except *F* (Ensemble).

Fees are payable to the Bursar's Office of Duke University upon notification from that office at the beginning of each semester as follows:

- One ½ hour private lesson per week for one semester.....\$ 60.00
- Two ½ hour private lessons per week or one 1-hour private lesson per week for one semester..... 100.00
- One 1-hour class lesson per week for one semester..... 25.00

All students registered for applied music instruction are charged for practice room facilities—students having practice facilities off campus *must* notify the departmental office of this fact by the end of the third week of *each* semester; otherwise they will be automatically billed as follows:

Medium A. Piano	{	\$20.00 per semester (room with piano or organ)
Medium E. Voice		
Medium G. Organ		
Medium B. Strings	{	\$15.00 per semester (room without piano)
Medium C. Woodwinds		
Medium D. Brass		
Medium F. Ensemble		
No practice room fee is charged		

Departmental Major

Prerequisites. Music 5-6, 15, and one year of applied music study in instrument or voice. Any or all of these may be exempted through demonstration of proficiency by examination and/or audition.

Major Requirements. Music 76, 77, 116, 156, 157, 158, 159, and one additional elective course in the department.

Departmental Organizations

Concert Band	Men's Glee Club
Symphony Orchestra	Women's Glee Club
Marching Band	Men's Chorus
Chancel Singers	Women's Chorus

Departmental Ensembles

- Brass Ensemble
- Chamber Orchestra
- Madrigal Singers
- Piano Ensemble (may be in combination with Instruments or Voice)

String Ensemble (Sonata, Trio, or Quartet)
Vocal Ensemble (Opera Workshop)
Woodwind Quintet

Philosophy

Professor Welsh, *Chairman*; Assistant Professor Aquila, *Director of Undergraduate Studies*; Professors Baylis, Clark, Negley, Peach, and Welsh; Assistant Professors, Aquila, Kalke, and Mahoney; Instructors Ashley and Love

The undergraduate program in the Department of Philosophy is designed to acquaint students with the content and the structure of philosophical theory in various areas. Discussion is encouraged so that the student can engage actively in the philosophical examination of problems.

Course offerings fall into two general categories: the systematic and the historical. In a systematic treatment, the organization of a course is primarily in terms of the problems presented by the subject matter of that course, as in logic, ethics, and metaphysics. In historical courses, attention is directed more to the order of development in the thought of a particular philosopher (Plato, Aristotle, Kant), or in a historical period. In all courses, reading of the works of philosophers will acquaint the students with the important and influential contributions to the definition and solution of philosophical issues.

The problems raised in philosophy in respect to the various fields of the arts and sciences involve questions which are not normally given attention in those particular disciplines. In the consideration of such problems, therefore, it is expected that the student will acquire some understanding and perspective of the major areas of man's intellectual endeavor. In this sense, philosophical comprehension is an essential part of a student's learning and education.

41. *Introduction to Philosophy*. Examination of problems in philosophy; emphasis on metaphysics and theory of knowledge. One course. *Staff*

42. *Introduction to Philosophy*. Examination of problems in philosophy; emphasis on ethics and value theory. One course. *Staff*

43S. *Introduction to Philosophy*. Philosophy 41 conducted as a seminar. One course. *Staff*

44S. *Introduction to Philosophy*. Philosophy 42 conducted as a seminar. One course. *Staff*

Only one of 41, 42, 43S, or 44S may be taken for credit. Not open to juniors and seniors.

48. *Logic*. A study of the conditions of effective thinking and clear com-

munication. Examination of the basic principles of deductive reasoning. One course. *Clark, Kalke, and Welsh*

93, 94. *History of Philosophy: Ancient and Modern*. An introduction to philosophy through the study of some of the major writings of the ancient Greek philosophers (93) and modern philosophers through Kant (94). Two courses. *Aquila, Mahoney, and Peach*

101. *Philosophy of Religion*. A philosophical examination of selected concepts and doctrines of religion. One course.

103. *Symbolic Logic*. Detailed analysis of deduction and of deductive systems. Open to sophomores by permission of instructor. One course. *Clark*

104. *Philosophy of Science*. The principal philosophical and methodological problems in contemporary science. One course. *Kalke*

107. *Political and Social Philosophy*. Discussion of the fundamental principles of political and social organizations, with particular attention to democratic philosophy, corporate theory, and Marxist-Soviet philosophy. One course. *Negley*

108. *Social Ideals and Utopias*. Reading of selected Utopias; analysis of the value-structures and political principles of these ideal societies. One course. *Negley*

109. *Philosophy of Language*. A philosophical analysis of problems arising in the study of language and symbolism. Topics include: theories of language, the nature of signs and symbols, theories of meaning, types of discourse (scientific, mathematical, poetic), definition, ambiguity, metaphor. One course. *Welsh*

110. *Epistemology*. A treatment of the problems of truth and knowledge; of a priori and empirical statements; and of theories of perception and probability. One course. *Baylis*

111. *Metaphysics*. A consideration of a selection from the following: Hegelian essentialism and existentialist reaction; traditional treatments of the mind-body problem: dualism, phenomenism, and materialism; rival theories of causation, space, and time. Prerequisite: one course in philosophy. One course.

112. *Philosophy of Mind*. Such topics as mind and body, thought, perception, persons, and personal identity. One course. *Aquila and Kalke*

116. *Systematic Ethics*. Systematic treatment of fundamental problems in moral philosophy. One course.

117. *Ancient and Modern Ethical Theories*. The development of ethical thought in the West; the interaction between culture and ethical theory, with special reference to the Greek city-state, Roman law, the Renaissance, the Reformation, and the rise of modern science. Readings in the great ethical philosophers. One course. *Welsh*

119. *Introduction to Medieval Philosophy*. Development of philosophy from late antiquity to the sixteenth century. Topics will include August-

tine, Avicenna, Averroes, Albert the Great, Aquinas, Scotus, Occam, and Latin Averroism. One course. *Mahoney*

130. *Kant*. Kant's philosophical views on epistemology, metaphysics, and ethics. One course. *Aquila*

132. *Nineteenth Century Philosophy*. Major nineteenth-century philosophers; emphasis on the German tradition: Hegel, Schopenhauer, and Nietzsche. One course. *Aquila*

191, 192, 193, 194. *Independent Study*. Directed reading and research. Open only to highly qualified students in the junior and senior years, by permission of the department. *Staff*

199. *Seminar in Philosophy*. Topic to vary. Non-majors require consent of instructor. One course. *Staff*

For Seniors and Graduates

202. *Aesthetics: The Philosophy of Criticism*. A study of some fundamental issues in aesthetics with particular reference to the fields of literature, music and painting. Problems discussed include the role of standards in criticism, aesthetic judgment, interpretation and evaluation in the arts, meaning in the arts, art and truth, the arts and morality. Open to juniors with the approval of the instructor. One course. *Welsh*

203. *Contemporary Ethical Theories*. Study of the nature and justification of basic ethical concepts in the light of the chief ethical theories of twentieth century British and American philosophers. One course. *Baylis*

205. *The Philosophy of History*. Discussion of the method, metaphysical implications, and influence of interpretations of history; Hegel, Marx, Spengler, Toynbee. One course. *Negley*

208. *Political Values*. Analysis of the systematic justification of political principles and the political values in the administration of law. One course. *Negley*

211. *Plato*. A critical study of selected dialogues, with emphasis on problems in epistemology and metaphysics. One course. *Mahoney*

217. *Aristotle*. A study of passages from the *Organon*, *Physics*, *De Anima*, and *Metaphysics*. One course. *Mahoney*

218. *Medieval Philosophy*. A critical examination of selected problems in medieval philosophy. One course. *Mahoney*

219. *Kant's Moral Philosophy*. Reading and discussion of his writing on morals, with some attention to historical continuity. One course. *Negley*

*225. *British Empiricism*. A critical study of the writings of Locke, Berkeley, or Hume with special emphasis on problems in the theory of knowledge. One course. *Peach*

227. *Continental Rationalism*. A critical study of the writings of Descartes, Spinoza, or Leibniz with special emphasis on problems in the

*Not offered in 1970-71.

theory of knowledge and metaphysics. (1970-71: Descartes.) One course. *Peach*

228. *Recent and Contemporary Philosophy*. A critical study of some contemporary movements in philosophy with special emphasis on the work of Moore, Russell, Wittgenstein, Wisdom, and Ryle. One course. *Welsh*

229. *American Pragmatism*. Studies in the philosophy of Pierce, James, Dewey, and Mead. One course. *Welsh*

231. *Classical German Philosophy*. Selected topics in eighteenth and nineteenth century German philosophy. Kant's *Critique of Pure Reason*. One course. *Aquila*

233. *Methodology of the Empirical Sciences*. An introduction to recent philosophical discussion of a variety of problems, e.g., the concept of a scientific explanation, the nature of laws, theory and observation, and other topics. Approval of instructor required for undergraduates and students from departments other than Philosophy. One course. *Kalke*

234. *Problems in the Philosophy of Science*. Selected problems in the physical and non-physical sciences, e.g., space and time, measurement, probability and induction, and the philosophy of the behavioral and social sciences. Approval of instructor required for undergraduates and students from departments other than Philosophy. One course. *Kalke*

241. *Logic*. Fundamental problems of logic. One course. *Clark*

250. *Philosophical Analysis*. A critical study of recent and contemporary essays in philosophical analysis, and an evaluation of the nature, methods, and results on this movement. One course. *Baylis and Clark*

251. *Epistemology*. The nature and limits of knowledge; the problems of certainty and perception. One course. *Baylis*

252. *Metaphysics*. A critical and evaluative study of rival metaphysical theories and their bases. Analysis of the fundamental metaphysical categories and of metaphysical methods. One course. *Baylis and Clark*

253. *Philosophy of Mind*. Analysis of concepts such as thought and belief; issues such as mind-body relations, thought and action, the nature of persons and personal identity. One course. *Aquila and Clark*

291, 292. *Critical Philosophy*. The analysis of basic philosophical concepts and beliefs with a view to critical evaluation and constructive emendation of them. Emphasis on the practice as well as the principles of philosophical criticism and problem solving. Enrollment only by permission of the department; Philosophy 291 is ordinarily prerequisite for 292. One course each semester. *The Graduate Staff*

Departmental Major

Philosophy 48 (Logic) is recommended for all those intending to major in philosophy. Philosophy 41 or 42 is ordinarily a prerequisite to major work.

Major requirements. Twenty-four semester hours in philosophy of which at least eighteen must be in courses numbered above 48. The following must be included: Philosophy 93, and 94; one non-introductory course in theory of value.

Related Work. Six hours minimum in each of two departments approved by the philosophy adviser. Courses may not be those primarily open to freshmen. There is no restriction in principle as to departments in which related work may be taken, and the approval of the philosophy adviser is required only to insure some coherence in the program of major and related work as a whole.

The department offers work leading to Graduation with Distinction. See the section on Honors.

Physics

Professor Fairbank, *Chairman*; Professor Meyer, *Director of Undergraduate Studies*; Professor David W. Carpenter, *Supervisor of Freshman Instruction*; Professors Biedenharn, Fowler, Gordy, Grculing, Lewis, Louck, and Newson; Associate Professors Bilpuch, Evans, Roberson, Robinson, and Walter; Assistant Professors Binkley, Dwight W. Carpenter, Cook, Dzubay, Fortney, Han, Lipshutz, Maraviglia, Poore, Rose, and Sykes; Instructors Browne, DeLucia, and Weaver.

1-2. Introductory Physics. This course traces historically and experimentally the development of the important principles of physics. Open to freshmen, sophomores, and juniors. Meets the general science requirement. Three lectures and one two-hour laboratory. Two courses. *Carpenter and Poore*

41-42. Fundamentals of Physics. For students interested in majoring in physics; usually taken in the freshman year. Basic principles of physics, mainly classical, at a level similar to Physics 51-52, but with emphasis on laying a foundation for further study. Three lecture-recitations and one three-hour laboratory. Prerequisites: approval of the department; Mathematics 31-32 or equivalent (may be taken concurrently). Two courses. *Rose*

51D-52D. General Physics. Basic principles of general physics treated more quantitatively than Physics 1-2. Designed for students entering medicine, engineering, and the sciences. Not open for credit to students who have completed Physics 1-2 or 41-42. Students planning to major in physics should enroll in Physics 41-42 in their freshman year. Three lecture-recitations and one three-hour laboratory period each week. Prerequisites: Mathematics 31, 32 or equivalent (may be taken concurrently). Two courses. *Binkley, Browne, DeLucia, Fowler, Lewis, Louck, and Robinson*

161, 162. *Modern Physics*. Review of electromagnetic fields, relativity, quantum phenomena, atomic and molecular spectra, solids, and nuclear physics. Three lectures each week. Prerequisites: Physics 41-42, Mathematics 32. 161 is prerequisite for 162. Two courses. *Evans and Lipshutz*

171. *Electronics*. A.C. circuits, transients, fundamentals of vacuum tubes and electron physics, basic electronic circuits. Three lectures and one three-hour laboratory. Prerequisite: Physics 41-42. One course. *Roberson*

176. *Thermodynamics and Kinetic Theory*. Thermodynamics, kinetic theory, and elementary statistical mechanics. Three lectures per week. Prerequisites: Physics 41-42, and differential and integral calculus. One course. *Meyer*

181-182. *Classical Mechanics*. Newtonian mechanics at the intermediate level. Motion of systems of particles and rigid bodies; conservation theorems; small oscillations; force problems and classical scattering. Two courses. *Cook*

185. *Optics and Spectroscopy*. Wave Motion; Fourier methods; geometrical and physical optics; coherence; lasers; atomic and molecular spectra. One course. *Maraviglia*

A course in general college physics, validated by examination, and a course in differential and integral calculus are prerequisites to all courses numbered 200 and above.

209. *Introduction to Solid State Physics*. Basic physical processes in solids with emphasis on dielectrics, metals, and semiconductors; crystal structure, thermal, and magnetic properties. One course.

215. *Introduction to Quantum Mechanics*. Wave-mechanics and elementary applications; the hydrogen-like atoms; electron spin and angular momentum; operators and eigen-values; stationary state perturbation theory; identical particles. Prerequisites: Physics 162, 182 or equivalents; Mathematics 285-286 should be taken concurrently. One course. *Evans*

217S, 218S. *Advanced Physics Laboratory and Seminar*. Experiments involving the fields of mechanics, electricity magnetism, heat, optics, and modern physics. Two courses. *Meyer and Dzubay*

220. *Advanced Electronics*. Vacuum tubes and solid state devices, advanced circuit analysis. Three lectures and one three-hour laboratory. One course. *Roberson*

221, 222. *Theoretical Physics*. Mechanics of particles and of rigid bodies, elasticity, fluids dynamics, electrodynamics; optics, relativity, thermodynamics, statistical mechanics, wave mechanics. Prerequisite: Mathematics 285-286 or equivalent to be taken at least concurrently. Two courses. *Cook*

223. *Electricity and Magnetism*. Electrostatics, magnetostatics, and

potential theory; dielectric and magnetic media; magnetic field of currents and law of induction. One course. *Carpenter*

224. *Electricity and Magnetism*. Maxwell's electrodynamics, theory of wave optics, refraction, interference and diffraction. Prerequisite: Physics 223. One course. *Carpenter*

225, 226. *Elementary Investigations*. The aim of this course is to provide training in the laboratory and library methods of physical research. Properly qualified students may conduct elementary investigations under the supervision of a member of the staff. One course each semester. *Staff*

Departmental Major

A student wishing to major in physics should arrange to complete the necessary mathematics as soon as possible. Special sections (denoted by an X in the course schedule) have been arranged in Physics 161-162. These sections are primarily for physics majors, and it is recommended that persons planning to major in physics should attempt to fit them into their schedules. This recommendation is not a requirement, however. Since Physics 1-2 is intended primarily for non-science majors, it is not recommended for physics majors.

For the A.B. degree:

Prerequisites: Physics 41-42 or 51D-52D or equivalent; Mathematics 31-32 or equivalent, 63, 68, or 131; Chemistry 1, 2 or 1, 42.

Major Requirements: At least eight semester courses in Physics from the available one hundred and two hundred-level courses. Of these at least two courses must be laboratory courses. A Physics major also normally takes two courses of related work beyond the introductory level, approved as a program by his Physics advisor.

For the B.S. degree:

Prerequisites: Physics 41-42 or 51D-52D or equivalent; Mathematics 31-32 or equivalent, 63, 68, or 131; Chemistry 1, 2 or 1, 42.

Major Requirements: At least ten semester courses in physics from the available 100- and 200-level courses. At least two of these must be laboratory courses. A B.S. physics major also normally takes three courses of related work beyond the introductory level, approved as a program by his physics adviser.

The department offers to the student in his senior year the possibility of being associated with research conducted in this institution. Such work may lead to Graduation with Distinction. See the section on Honors.

Political Science

Professor Hallowell, *Chairman*; Professor Thomas, *Director of Undergraduate Studies*; Professors Ball, Braibanti, Cole, Hall, Kornberg, Kulski, Leach, and Simpson; Adjunct Professor Grzybowski; Associate Professor Cook; Visiting Lecturer Smith; Assistant Professors Braithwaite, Fish, Paletz, and Spragens; Instructors Cochran, Frasure, Henry, Levy, O'Barr, and Pervan

The objective of the Department of Political Science is to acquaint students with the theory and practice of government and politics at the local, state, national, and international levels. Although primary attention is focused upon the American political and administrative system, emphasis is also placed upon a comparative study of the political institutions and movements of thought peculiar to the nations of Europe, Latin America, Africa, and Southern Asia. The student's attention is also directed to the problems encountered in international organization, politics, and law. The development of political philosophy from Plato to the present day is an essential part of the department's course offerings. Methods of study include the empirical, the historical, the legal, the comparative, and the philosophical.

Directing its effort to an intelligent understanding of the contemporary world and of the responsibilities which are laid upon citizens of a democracy, the Department of Political Science shares the objectives of a liberal arts education. Although the department does not aim at vocational education, the knowledge it seeks to impart should be useful to anyone contemplating a career in law, government service, or politics.

Students intending to major in the department should take Political Science 11 or 61. Ordinarily one of them must be taken before proceeding to more advanced work in the department. This rule may be waived with the consent of the Director of Undergraduate Studies.

The advanced courses are divided into four major groups. Majors are required to take at least one course in three of these groups.

Political Science 197 and 198 are designed to provide an opportunity for majors in the department to qualify for graduation with distinction.

Introductory Courses

11. *The American Political System.* Theory and practice of American government and politics. Freshmen only. One course. *Leach, Braithwaite, Paletz, Spragens, Cochran, and Frasure*

61. *The American Political System.* Theory and practice of American government and politics. Federal-state relations, the separation and interrelationships of the executive, legislative and judicial branches of government, judicial review, the role of political parties and public opinion,

the formulation and execution of domestic and foreign policy, civil liberties. One course. Kornberg, Leach, Simpson, Cook, Fish, Paletz, Henry, and Pervan

Students planning to major in Political Science or students seeking to meet the social science requirement should follow Political Science 11 or 61 with a 100 level course of their choice. Sophomores and juniors may not register in courses numbered above 200.

Political Theory and Methodology

123. *Introduction to Political Philosophy*. A course devoted to the reading and discussion of selected political classics including Plato's *Republic*, Aristotle's *Ethics* and *Politics* and other works as time permits. One course. Hallowell and Spragens

126. *Democratic Theory and Political Reality*. Normative goals and empirical analyses of existing democratic states. One course. Spragens

131. *Introduction to American Political Thought*. Basic elements in the American political tradition as developed from its English roots to the present. One course. Cook

132. *Contemporary Political Ideologies*. Communism, fascism, democracy, and other significant ideologies. One course. Cook and Henry

197. *Principles and Methods of Political Inquiry*. The methodological literature in political science; emphasis on training in doing research. Open only to juniors and seniors. Required of all political science majors who are candidates for the degree with distinction. Prerequisites: three courses in political science and consent of the instructor. One course. Braithwaite

222. *Empirical Theory*. Construction of empirical theory, particularly conceptualization, hypothesis formation, and testing; the logic of data collection and processing. One course. Braithwaite

223. *Political Philosophy from Plato to Machiavelli*. Intensive analysis of the political philosophies of Plato and Aristotle, a survey of medieval political thought and an analysis of the significance of Machiavelli. One course. Hallowell

224. *Modern Political Theory*. An historical survey and philosophical analysis of political theory from the beginning of the seventeenth to the middle of the nineteenth century. Attention is given to the rise of liberalism, the Age of Enlightenment, the romantic and conservative reaction, idealism, and utilitarianism. One course. Hallowell

229. *Recent and Contemporary Political Theory*. The rise of positivism and its impact upon modern political thought, the origins of socialism, Marxism and its variants, socialism in the Soviet Union, nationalism, Fascism and National Socialism, the crisis in modern democracy, Christianity and the social order. One course. Hallowell

231. *American Political Theory*. An analysis of the main currents in

American political thought from colonial beginnings to the present day, with emphasis upon the development of liberalism in America. One course. *Cook*

233. *Research Methodology*. The research process in political science, with emphasis on the quantitative analysis of data. One course. *Braithwaite*

249. *Comparative Political Analysis and Political Development*. General methodology of comparison of political systems. Institutional, structural, functional, and configurative modes of analysis. Theory of political development. Theoretical problems of induced political change. One course. *Braibanti*

Comparative Government and Politics

136. *Comparative Government and Politics: Europe*. The impact of social and economic change of European politics. Totalitarian vs. pluralistic models. Formal and informal political integration. Special attention to Great Britain, France, West and East Germany, the Soviet Union. One course. *Frasure, Henry, and Pervan*

155. *Problems of Political Development in the New States*. Survey of change and modernization in Africa and Asia; nationalism and neutralism, role of political parties, the military, and the bureaucracy in nation-building; economic growth and foreign aid. One course. *Braibanti and Smith*

165. *The Government and Politics of the U.S.S.R.* An analysis of the governmental institutions, party structure, and policies of the Soviet Union. Attention will be given to policies affecting the intelligentsia, the workers and the peasants. One course. *Kulski*

166. *Soviet Foreign Relations*. An analysis of relations between the Soviet Union and other states (Communist and non-Communist, Western and underdeveloped) as well as of the relations between the Communist Party of the Soviet Union with Communist parties in other countries. One course. *Kulski*

180. *Comparative Government and Politics: Southern Asia I*. Concepts of political development in new states, using India, Pakistan, Ceylon, and Malaya as case studies. Theory and practice of foreign aid and technical assistance as agents of political modernization. One course. *Braibanti*

181. *Comparative Government and Politics: Southern Asia II*. The political modernization of India and Pakistan since 1947. Constitutional developments as revealed in leading court judgments will be studied. Other topics will be the ideology of administrative reform, formulation of state polity, rural development and party politics. One course. *Braibanti*

214. *Comparative Administrative Law*. Comparative analysis of the role of administrative techniques in established and transitional con-

stitutional systems. French, German, British and American patterns. Control of legality and expediency of various types of judicial review. One course. *Gryzbowski*

225. *Comparative Government and Politics: Western Europe*. Modern political institutions and processes in Western Europe. One course *Cole*

235. *The Commonwealth*. An analysis of the political relationships between the members of the Commonwealth and a comparative study of the political systems of the Commonwealth countries, with particular reference to Canada. One course. *Cole*

250. *Comparative Government and Politics: Southern Asia*. The political development of India and Pakistan. Contextual determinants of the political systems. Political consequences of partition. National integration, constitutional and institutional aspects of the political systems. Impact of foreign technical assistance. One course. *Braibanti*

253. *Comparative Government and Politics: Latin America*. Politics and government in selected Latin American states, including Argentina, Brazil, Chile, and Mexico. Political forces and their impact upon governmental institutions. One course. *Ball*

277. *Comparative Party Politics*. The impact of social and political systems on party structures, functions, ideologies, and leadership recruitment. Emphasis upon research techniques and objectives. One course. *Kornberg*

280. *Comparative Government and Politics: Sub-Saharan Africa*. Particular attention will be given to traditionalism and modernization, ideologies, leadership, party systems, the adaptation of parliamentary institutions, Africanization of the civil services, and the problem of political integration. One course. *Smith*

American Government and Public Administration

105. *The Black American in Politics*. Behavior of black people in the American political system, with special attention to voting, organizations, and the black power movement. One course. *Staff*

108. *The American Presidency*. The presidency and its impact on the American political system. One course. *Paletz*

109. *State and Local Government Today*. Problems in state, county and city government: administration of services such as education, public welfare, law enforcement, inter-governmental relationships, administrative reorganization, methods of popular control and the reconstruction of state and local government to meet present-day needs. One course. *Leach*

125. *American Political Parties and Practical Politics*. A study of the historical development, organization, and methods of political parties in the United States. One course. *Simpson*

127. *Law and Society*. Nature and functions of law; Anglo-American legal institutions, the process of judicial decision-making, and the relationships among judges, lawyers, legislators, and administrators in the development of public as well as private law. Open only to juniors and seniors. One course. *Fish*

129. *Groups in American Politics*. Theory and practice of the interest-group approach to the study of American politics. One course. *Paletz*

130. *Politics and the Media of Mass Communication*. Activities of the media of mass communication as they affect the American political system and process. Governmental impact on the mass media. One course. *Paletz*

137. *Political Behavior in Elections*. The behavioral approach will be used to examine decision-making in the political process. Attention will be focused on the major factors that affect the outcome of elections, such as the characteristics of the American voter, the conduct of campaigns, the influence of propaganda and public relations techniques, and the influence of campaign finance. One course. *Frasure*

138. *Political Behavior in Policy-Making*. A study of the major factors that come into play in the making of governmental policy decisions. Special attention will be paid to the role of pressure groups and the methods of their lobbyist representatives, to the effects of pressures from constituents, and to the pressures of the executive and legislative branches upon each other. One course. *Braithwaite and Henry*

139. *Science and Government*. The impact of science on governmental policies, processes, and institutions. The effect of government on science. One course. *Braithwaite*

141. *Public Administration*. An introduction to the role of administration in the governmental process considering principles of administrative organization, methods of administrative control, personnel and fiscal management. In general the study of the organizational and administrative problems encountered by any government agency charged with carrying out a public policy. One course. *Hall*

142. *Administrative Responsibility*. An evaluation of political, legal, and administrative methods of achieving a responsible bureaucracy in American national government. Comparisons with relevant experience and techniques in other countries such as Great Britain and France. One course. *Hall*

143. *The Politics of Distribution*. Governmental policies in areas such as education, housing, health, and welfare to which significant allocations of resources have recently been made. One course. *Thomas*

146. *Legislation*. A study of the composition and structures of legislative bodies and of the legislative process with attention to procedure, methods, techniques, delegation of discretion, and the use of controls. One course. *Simpson*

164. *Government Regulatory Policy and Administration*. Regulatory

policies of the U.S. government; administrative procedures and organizations designed to implement those policies. One course. *Thomas*

174. *Political Implications of Economic Legislation*. A study of political and sectional alignments in the passage of tariff, farm, railway, New Deal, and other economic legislation. One course. *Simpson*

199. *The Changing South*. (See Interdisciplinary Course 199.)

207. *American Constitutional Interpretation*. Development of the Constitution of the United States through Supreme Court decisions. One course. *Fish*

209. *Problems in State Government in the United States*. A study of the historical development of state governments, their present organization and subdivisions, and their relation to each other. Special attention is given to the position of the states in the federal union through the study of federal-state, interstate, and state-local relations. One course. *Leach*

230. *American National Government*. Formation and contemporary operation of the national political system; historical and behavioral approaches. One course. *Thomas*

241. *Public Administrative Organization and Management*. The American administrative process: theory and practice of administrative organization and management. One course. *Hall*

243. *Administrative and Organizational Theory and Behavior*. Behavioral analysis of public bureaucracies in the United States. One course. *Thomas*

244. *Administrative Law and Process*. The nature and law of the administrative process in the context of American government and politics, with special attention to the powers, procedures, and judicial control of administrative agencies. One course. *Hall*

246. *Administration and Public Policy*. The role of the administrative official as a policy-maker in modern American politics. One course. *Thomas*

275. *The American Party System*. An intensive examination of selected facets of American national political parties, such as: relationships between presidential and congressional politics, the politics of national conventions, recent foreign policy and party alignments, and the controversy over party government. One course. *Kornberg*

285. *The Judicial Process*. A study of judicial decision-making in the United States, with emphasis on the process of litigation, the recruitment of judges, the influences and limits on judicial decisions, and their impact within the political system. Prerequisites: Political Science 127 or 207 or their equivalents. One course. *Fish*

291. *Problems of Urban Government*. Analysis of problems in the structure and functions of urban governments in the United States. One course. *Leach*

293. *Federalism*. Theoretical and operational aspects of federalism, with emphasis on their application in the American governmental system. One course. *Leach*

International Law and Relations

121. *Elements of International Relations*. The nature of international politics; the analysis of national power; the instruments of foreign policy; and the controls of state behavior. One course. *Ball*

122. *Modern International Politics*. An examination of the major problems of postwar international politics with particular attention to the extension of Soviet power, the Western response to this challenge, and the revolutions in the Afro-Asian world. One course. *Frasure*

124. *The New States of Africa in World Affairs*. A study of the international political problems arising from the emergence of independent states in sub-Saharan Africa. One course. *O'Barr*

157. *U.S. Foreign Policy*. Principles and problems; changing conceptions of diplomacy. One course.

158. *Control of American Foreign Policy*. A consideration of the forces which are responsible for the formulation of American foreign policy, and a study of the important factors which have influenced contemporary United States policy in the major areas of the world. The course includes an analysis of the respective roles of the President, Congress, Department of State, and the United Nations, as well as military and public opinion. One course. *Ball*

220. *Problems in International Politics*. Such topics as nuclear power, bipolarity and polycentrism, nationalism, national interests and ideology, the revolution of modernization and regional integration. One course. *Kulski*

221. *International Public Organization*. A study of the structure and functioning of the United Nations organs, or related specialized agencies such as the International Labor Organization, and of regional agencies such as the Organization of American States and the North Atlantic Treaty Organization. One course. *Ball*

227. *International Law*. Elements of international law, particularly as interpreted and applied by the United States; rights and duties of states with respect to recognition, state territory and jurisdiction, nationality, diplomatic and consular relations, treaties, treatment of aliens, pacific settlement of disputes, international regulation of the use of force, and collective responsibility. One course. *Grzybowski*

237. *Problems in American Foreign Policy*. The decision-making process as applied to contemporary foreign policy issues. Prerequisite: Political Science 122 or the equivalent. One course. *Ball*

Independent Study

191, 192. *Independent Study*. Directed reading and research. Open only to qualified juniors by permission of the Director of Undergraduate Studies and of the individual instructor. One course. *Staff*

193, 194. *Independent Study*. Directed reading and research. Open only to seniors by permission of the Director of Undergraduate Studies and of the individual instructor. One course. *Staff*

Undergraduate Seminars

11S. *Freshman Seminar in American Government and Politics*. Preference given to prospective majors. One course. *Staff*

61S. *Sophomore Seminar in American Government and Politics*. Preference given to prospective majors. Not open to those who have taken 11 or 11S. One course. *Staff*

Sophomore and Junior Seminars in Political Science. Prerequisites: Political Science 11 or 61 and the consent of the instructor. Open to non-majors as well as to majors. One hundred courses designated in the class schedule with an S will be limited in enrollment to a maximum of fifteen students and conducted as seminars. Different courses will be so designated in different years. When so designated enrollment will be limited to sophomores and juniors. Consult the official class schedule issued at the beginning of each semester for those currently being offered.

Senior Seminars in Political Science. Prerequisites: Political Science 11 or 61 and one 100- or 200-level course in the field represented by the seminar and the consent of the instructor. Preference given to majors. Each seminar will not necessarily be offered every year. Consult the official class schedule.

200A. *Seminar in American Government and Politics*. One course. *Staff*

200B. *Seminar in Comparative Government and Politics*. One course. *Staff*

200C. *Seminar in Political Theory*. One course. *Staff*

200D. *Seminar in International Relations*. One course. *Staff*

198. *Seniors Honors Seminar*. Open only to senior political science majors who are candidates for the degree with distinction. Preparation and writing of a research paper; group meetings to discuss common problems. Prerequisites: Political Science 197 and the consent of the instructor. One course. *Staff*

Departmental Major

Major Requirements. Political Science 11 or 11S, or 61 or 61S. Seven courses in the department above 11 or 61 including two 200-level courses

or 200-level seminars. Majors must take at least one course in each of three fields. Four related courses in departments approved by the political science adviser. Such courses are usually taken in the Departments of Economics, History, Philosophy, Psychology, and Sociology.

Honors: Any student who is qualified (see the section on Honors in this *Bulletin* for general requirements) may undertake work leading to a degree with distinction in political science by presenting himself to the Director of Undergraduate Studies as a candidate. In addition to meeting the normal requirements of a major in the department, the candidate for Graduation with Distinction must take Political Science 197 and 198. He must prepare a research paper on which he will be orally examined by a committee of three departmental faculty members.

Portuguese

For courses in Portuguese, see *Romance Languages*.

Psychology

Professor Alexander, *Chairman*; Associate Professor Wing, *Director of Undergraduate Studies*; Professors Brehm, Carson, Diamond, Guttman, Jones, Wallach, and Lakin; Associate Professors Altrocci, Borstelmann, R. Erickson, Linder, Lockhead, McHugh, Schiffman, and Staddon; Research Associate Professor Gaffron; Assistant Professors Coie, Costanzo, C. Erickson, Kramer, Kremen, and Wortman; Lecturers Clifford, E. Crovitz, H. Crovitz, Eisdorfer, Feather, I. Gehman, Huse, Kinsbourne, Krugman, Obrist, Peele, Shows, Somjen, Thompson, Wolbarst; Adjunct Instructor Musia Lakin

70S, 71S. *Freshman Seminars*. Intensive experience through the study of one or two problems of special interest; does not fulfill departmental prerequisites. Prerequisite: departmental permission. Half-course or one course each. *Staff*

The following four first level courses are open to second semester freshmen, sophomores, juniors, and seniors without prerequisite. Some of these courses will have discussion sections or preceptorials, with the availability of these experiences to be specified prior to preregistration.

92. *Sensation, Perception, and Learning*. (Formerly Psychology 91.) Sensation, including psychophysics and receptor processes. The concept of reflex, both physiological (Sherrington) and behavioral (Pavlov). Complex organization: learning, perception, and cognition. One course. *Guttman, Lockhead, Schiffman, and Staddon*

93. *Biological Basis of Behavior*. (Formerly Psychology 91.) Behavior

as a product of evolution and the role of behavior in species survival. Neural and endocrine factors in reproduction, hunger, thirst, emotion, and intelligence. Heredity-environment in the development of behavior. One course. *Diamond and C. Erickson*

94. *Personality*. (Formerly Psychology 100.) Representative theories of personality, from Freud to the present, emphasizing problems of normal personality structure, dynamics, development, and assessment. Not open to students who have had Psychology 116. One course. *Alexander, Carson, and Kramer*

95. *Developmental Psychology*. (Formerly Psychology 121.) Theory and research on growth and behavior from infancy to adolescence; special emphasis on personality and cognitive development. One course. *Coie and Costanzo*

Intermediate and advanced lecture courses: Some of these offerings will include discussion sections or preceptorials, as specified prior to pre-registration.

101. *Social Psychology*. Problems, concepts, and methods in the study of social interaction and interpersonal influence. Prerequisites: one course in psychology at the 90-level or permission of the instructor. One course. *Jones and Linder*

110. *Applied Psychology*. Applications of psychology to problems of personnel selection, industrial efficiency, advertising, and selling. Prerequisites: one course in psychology. One course. *Staff*

117. *Statistical Methods in Psychology*. Elementary statistical techniques and their application to the analysis and interpretation of psychological data. Theory of inference is stressed. Psychology majors only. One course. *Staff*

122. *Laboratory in Observation of Children*. Aspects of cognition, personality, social development, and child-adult relationships. Open only to junior and senior psychology majors with the permission of the instructor. One course. *Musia Lakin*

126. *Adolescent Psychology*. Mental, social, and emotional development of adolescence and youth. Prerequisite: Psychology 95 or the equivalent. One course. *Staff*

132. *The Psychology of Individual Differences*. Nature and causes of individual and group variations in intelligence, special abilities, social and emotional characteristics. Prerequisite: one course in psychology. One course. *Wing*

138. *Abnormal Psychology*. (Formerly Psychology 141.) Disordered behavior and constructive personality change are viewed in interpersonal and social context for purposes of understanding normal and abnormal personality development and functioning. Prerequisite: Psychology 94 or 95. One course. *Altrocchi and Carson*

139. *Motivation*. (Formerly Psychology 149.) Contemporary use of such concepts as instinct, drive, and expectancy in the explanation of

behavior; the role of nervous mechanisms and hormones in the control of goal-directed behavior. Prerequisite: Psychology 92 or 93. One course. *C. Erickson and R. Erickson*

Laboratory Courses (140 through 149): These courses are open chiefly to juniors and seniors. The subject matter varies, but these courses have in common a concern with the design and execution of psychological experiments. Students will find them helpful as a means of gaining experience before engaging in independent study. These courses fulfill the seminar learning experience requirement at the junior-senior level.

140. *Research Methods in Child Development*. Replication of existing research paradigms, critique of representative studies, and formulation of new approaches; emphasis on the preschool child. Prerequisite: Psychology 95. One course. *Borstelmann and Coie*

141. *Tests and Measurements*. (Formerly Psychology 130.) Test methods used by psychologists to measure and evaluate mental processes. Prerequisite: Psychology 117 or the equivalent. One course. *Schiffman and Wing*

142. *Instrumental Behavior*. Laboratory course using animal subjects in operant-conditioning situations. Prerequisite: Psychology 92. One course. *Guttman and Staddon*

143. *Experimental Methods in Cognitive Psychology*. Human cognition; language, memory, problem-solving, and other higher mental processes. One course. *Wortman*

144. *Experimental Approaches to Learning*. Basic facts and principles of human and animal learning. Prerequisite: Psychology 92. One course. *Guttman and Staddon*

145. *Experimental Approaches to Personality*. Methods applied to personality research. Prerequisite: Psychology 94. One course. *Costanzo, Schiffman, and Wallach*

146. *Experimental Comparative Psychology*. The bearing upon general psychological theory of experimental investigations of animal behavior in the fields of motivation and learning. Prerequisite: Psychology 92 or 93. One course. *C. Erickson*

147. *Experimental Social Psychology*. Group dynamics, attitude change, and interpersonal perception. Prerequisite: Psychology 101. One course. *Brehm, Jones, and Linder*

148. *Psychology of Perception and Thinking*. Basic phenomena of perception and thinking as determined by conditions in the external situation and in the person, biological and psychological. Prerequisite: Psychology 92. One course. *H. Crovitz and Lockhead*

149. *Physiological Psychology Laboratory*. (Formerly Psychology 152.) Neural bases of behavior, sensory and motor functions of the nervous system, and problems of emotion, motivation, and consciousness. Laboratory in psychophysics and the electrical activity of the nervous system.

Prerequisites: Psychology 93, Physics 1-2, or Chemistry 1-2 or permission of the instructor. One course. *R. Erickson*

Courses numbered 150-170 fulfill the seminar learning experience requirement at the junior-senior level.

151. *Psychology and International Relations*. Application of psychological theories to problems of international relations. Prerequisites: two courses in psychology and permission of instructor. One course. *Martin Lakin and Wortman*

152. *Psychological Approaches to Contemporary Problems*. Relevance of various psychological theories and findings to selected contemporary issues. Prerequisite: permission of the instructor. One Course. *Wortman*

165. *Personality Theory*. Theories of personality from larger metatheoretical perspectives. Open to junior and senior majors in psychology, or by permission of the instructor. Prerequisite: Psychology 94. One course. *Alexander or Kremen*

170. A-D. *Seminar in Selected Problems*. One course each. *Staff*

Tutorial Study: For juniors and seniors. Small group discussions of influential books and articles in psychology. The availability of tutorials, their content, and their instructors will be announced before preregistration.

171, 172. *Junior Tutorial*. Prerequisites: Psychology 92 or 93, Psychology 94 or 95 and permission of the Director of Undergraduate Studies. Half-course or one course. *Staff*

173, 174. *Senior Tutorial*. Prerequisites: Psychology 92 or 93, Psychology 94 or 95, Mathematics 32, 51, 133, 135, 136 or Psychology 117 or the equivalent, and permission of the Director of Undergraduate Studies. Half-course or one course. *Staff*

177, 178. *Independent Research*. Admission to the course requires formulation of a study plan with a faculty supervisor and approval of the Director of Undergraduate Studies. Prerequisites: Psychology 92 or 93, Psychology 94 or 95, and one psychology course numbered 140 through 149; Mathematics 133 or Psychology 117 will be helpful. One or two courses. *Staff*

191, 192. *Junior Independent Study and Research*. Directed reading and research. Open only to highly qualified juniors who expect to graduate with distinction in psychology. Prerequisite: permission of the department. One or two courses. *Staff*

193, 194. *Senior Independent Study and Research*. Directed reading and research for seniors planning to graduate with distinction in psychology. Prerequisite: permission of the department. One or two courses. *Staff*

Courses at the 200-level are open to selected undergraduates with written permission of the instructor.

203. *Sensation and Perception*. Classical concepts in sensation and perception and the resulting psychophysical data for each of the major senses, with emphasis on vision and audition. One course. *Lockhead*

204. *Comparative Psychology*. Ontogeny, evolution, adaptive significance, and physiology of animal behavior. One course. *C. Erickson*

210. *Cognition and Higher Mental Processes*. An intensive analysis of the literature on thinking, problem-solving, creativity, language, and related topics. Emphasis is upon the functional significance of these aspects of intellectual activity and upon the experimental methodology involved in their study. One course. *Wortman*

213. *Conditioning and Learning*. Classical and instrumental conditioning; emphasis on the empirical laws of simple learning. One course. *Staff*

215. *Developmental Psychology*. A consideration of selected research areas in child behavior and development, including personality, cognition, perception, and learning. One course. *Staff*

216. *Biological Psychology*. The methods of biology (as applied to psychology), especially in neurophysiology, neuroanatomy, and genetics. Topics covered include: (a) the genetics of behavior (b) the organization of the dorsal thalamus and neocortex, and (c) the limbic system and hypothalamus. Methods covered include: (a) ablation method, (b) method of evoked potential, (c) electrical stimulation of the brain, and (d) classical and physiological genetics. One course. *Diamond*

217. *Social Psychology*. Social factors in cognition, models of social interaction, conformity and social influence, attitude development and change. One course. *Jones*

218. *Research Methods in Social Psychology*. Emphasis on the interplay between experimental design and technique. One course. *Linder*

219. *Physiological Psychology I*. The structure and function of the nervous system as related to problems of sensory-motor processes and learning. One course. *R. Erickson*

220. *Physiological Bases of Behavior*. Emphasis on the neural, hormonal, and developmental bases of motivational behavior. One course. *C. Erickson*

234. *Seminar in Personality*. Selected research topics of current interest in experimental study of personality, including risk-taking, creativity, and cognitive styles. One course. *Wallach*

*236. *Theoretical Psychology*. Survey of representative systematic formulations and schools in historical sequence. Study of relationships between various philosophical, scientific, and cultural thought-patterns and the forms of psychological theories. One course. *Guttman*

238. *The Electroencephalogram and Psychological Function*. A survey of experimental and clinical literature on brain wave correlates of intelligence, personality, behavior disorders, epilepsy, sleep, sensory stim-

*Not offered in 1970-71.

ulation, reaction time, and attention. Special emphasis is placed on the electrophysiology of conditioning and learning. Lectures, laboratory demonstrations, and clinical case presentations. One course. *Obrist*

239. *Behavioral Correlates of Brain Damage in Man*. Effects of brain damage on psychological functioning. Known brain-behavior relationships and problems encountered in the study of brain function. Laboratory demonstrations for assessment of cerebral dysfunction through the use of standard psychological tests. One course. *Thompson*

245. *Personality Theory I*. Representative theories of human functioning, from Freud to neoanalytic approaches. One course. *Alexander and Kremen*

246. *Personality Theory II*. Representative models of human functioning, as field theory, behavior theory, type or trait theory, and ego psychology. One course. *Alexander or Kremen*

271. *A-D. Seminar in Selected Problems*. One course each. *Staff*

273. *Principles of Psychological Measurement*. Topics include methods of psychometric scaling, test construction, as well as selected methods for data analysis. Prerequisite: Mathematics 232 or equivalent. One course. *Schiffman*

282. *Introduction to Methods in Psychotherapy*. Current trends in psychotherapeutic practice and research are discussed, as a means of introducing the student to the field. Emphasis is upon the application of principles drawn from theories of personality to individual and group psychotherapy. Discussions of selected readings and some field experience in therapy are included. One course. *Lakin and Carson*

291. *Seminar in Community Mental Health*. Psychological epidemiology and ecology; primary, secondary, and tertiary prevention; the public health approach to problems of psychological disorders and psychological well-being. One course. *Altrocchi*

292. *The History of Psychology*. One course. *Guttman*

293. *Methods in Developmental Psychology*. Methodological and epistemological issues in research in development. Individual and group research projects are an integral part of the course. One course. *Staff*

Departmental Major

Requirements. Psychology 92 or 93 and 94 or 95. At least one of the following courses: Mathematics 32, 51, 133, 135, 136, Psychology 117 or the equivalent. One laboratory course in the 140-149 series. Four additional psychology courses of student's selection.

Students seeking a B.S. degree must complete, in addition to the above requirements, a minimum of four laboratory courses in the sciences and Mathematics 21 and 22, or their equivalent.

Interdisciplinary programs. Psychology touches upon and merges with many related fields of study. The department encourages its students

to consider interdisciplinary majors. Some examples of possible programs are biological psychology, mathematical psychology, and philosophy and psychology. Students who contemplate an interdisciplinary program should make appropriate plans as early as possible in their undergraduate careers.

Religion

Professor Langford, *Chairman*; Assistant Professor Partin, *Director of Undergraduate Studies*; Assistant Professor Kort, *Supervisor of Freshman Instruction*; Professors Phillips, Poteat, and Price; Associate Professors Bradley, Clark, Jones, McCollough, Osborn, and Wintermute; Assistant Professors Charlesworth, Jenks, Meyers, and Ricketts; Lecturer Shows

The academic study of religion is integral to a liberal education. The curriculum is determined by the subject around which the department is formed, by the various areas and methods for the study of religion, and by the department's desire to increase and discipline the students' understanding of and appreciation for, those religious phenomena and problems brought into focus by each area and method.

In addition to biblical studies and studies in Christian history, ethics, and theology, the department offers courses in Judaic and non-Western religious studies as well as courses of a substantially interdisciplinary character (religion and the social sciences and religion and the humanities).

Courses numbered below 100, with the exception of Religion 70S and Religion 71S, are open to all students. Religion 70S and 71S are freshman-sophomore seminars. (The specific topics for these seminars and the names of instructors will be announced prior to preregistration.) One-hundred-level courses are open to juniors and seniors without prerequisite except in the cases in which the requirement of permission of the instructor is stated at the end of the course description. Freshmen and sophomores who have completed one course below 100 may be admitted to 100-level courses with the exception of junior-senior seminars. (The topics for these seminars and the names of the instructors will also be announced prior to preregistration.)

50. *The Old Testament*. (Formerly Religion 1, 51.) Historical, literary, and theological investigations. One course. *Staff*

52. *The New Testament*. (Formerly Religion 2, 52.) Origins, development, and content of thought. One course. *Staff*

55. *The Religion of the Bible*. An historical, cultural, and theological study of the Old and New Testaments. One course. *Staff*

57. *Introduction to the History of Religions*. (Formerly Religion 93.)

Historico-religious study of primitive religions, Hinduism, Buddhism, Islam, and other religions. One course. *Staff*

59. *Problems in Theology and Ethics*. Philosophical, theological, and cultural problems, such as the existence of God, ethical theory, religious language, and the relation of religion to culture. One course. *Staff*

70S, 71S. *Freshman-Sophomore Seminars: Religious Studies*. Topics and instructors to be announced. One course.

100. *Principles of Investigation*. An introduction to the resources and methods appropriate to advanced study in religion. Required of all majors. Departmental permission required. Half-course. *Wintermute*

Biblical Studies

104. *The Prophets of the Old Testament*. (Formerly Religion 111.) Their historical setting and message. One course. *Wintermute*

105. *Theology of the Old Testament*. Emphasis upon history and eschatology, covenant, messianism, and wisdom; evaluation of Eichrodt, Jacob, and von Rad. One course. *Jenks*

106. *The Mission and Message of Jesus*. (Formerly Religion 121.) An analysis and interpretation of the Gospels. One course. *Charlesworth and Price*

108. *The Life and Letters of Paul*. (Formerly Religion 123.) Paul's role in the expansion of the Christian movement, the most important aspects of his thought, and his continuing influence. One course. *Charlesworth and Price*

109S, 110S. *Junior-Senior Seminars: Biblical Studies*. Topics and instructors to be announced. One course.

Studies in Christian Life and Thought

120. *History of the Christian Church*. (Formerly Religion 131, 132, 133.) Crucial events, issues, forms, and writings that have shaped the Christian community and influenced Western civilization from the time of the early church. One course.

124. *Christianity in America*. (Formerly Religion 137.) Representative men, movements, and thought in American Christianity. One course. *Jones*

126. *Themes in Christian Theology*. (Formerly Religion 140.) Study of Christian teachings concerning God, Jesus Christ, sin, and salvation, intended to serve as a basis for the student's evaluation of his own religious concepts. One course. *Langford*

128. *Current Interpretations of Christianity*. (Formerly Religion 149.) Contemporary Christian thought: Karl Barth, Paul Tillich, Karl Rahner, Hans Kung, and Harvey Cox. One course. *Osborn*

130. *Christian Ethics*. (Formerly Religion 152) Ethical implications

of biblical religion, the historical development of the Christian ethic, and the ethical dimensions of contemporary social life. One course. *Clark and McCollough*

138S, 139S. *Junior-Senior Seminars: Studies in Christian Life and Thought*. Topics and instructors to be announced. One course.

History of Religions

140. *Religions of South Asia*. Religious traditions of South Asia, with emphasis on Hinduism. One course. *Bradley*

141. *Religions of China and Japan*. Confucianism, Taoism, Buddhism, Shinto, and other religious traditions of China and Japan. One course. *Bradley*

142. *Myth and Symbol*. (Formerly Religion 178.) Historical and phenomenological study of religious myths and symbols, Christian and non-Christian. One course. *Partin*

143. *Mysticism*. (Formerly Religion 179.) The mystical element in religion: Hinduism, Buddhism, Christianity, and Islam. One course.

144. *Varieties of Early Judaism*. (Formerly Religion 125.) History and literature of Judaism from the time of Ezra through the second century Common Era. One course. *Meyers*

145. *Religious Quests of the Greco-Roman World*. (Formerly Religion 172.) Sectarian Judaism, Persian Dualism, the Mystery Cults, and Gnosticism. One course. *Wintermute*

146. *Contemporary Jewish Thought*. Judaism in the modern age, as reflected in the works of Buber, Kaplan, Herschel, Cohen, Rubenstein, and others. One course. *Meyers*

147S, 148S. *Junior-Senior Seminars: Judaic Studies*. Topics and instructors to be announced. One course.

149S, 150S. *Junior-Senior Seminars: History of Religions*. Topics and instructors to be announced. One course.

282. *Religion Among Preiterate Peoples*. (Formerly Religion 174.) Myth, ancestor veneration, concepts of deity, spirits, the trickster, shamanism, sacrifice, and initiation rites. One course. *Ricketts*

289. *World Religions and Social Change*. (Formerly Religion 176.) The contemporary role of Buddhism, Christianity, and Islam in Asia and Africa. One course. *Bradley*

Religion and the Social Sciences

151. *Ethical Issues in Social Change and Public Policy in America*. An examination, based on work in Christian ethics and current sociological theory. One course. *McCollough*

154. *Ethics and Modern Technology*. Emerging ethical issues created by the impact of technology on the psychological, social, political, and economic life of modern man. One course. *Clark*

155. *Ethical Issues in the Life Cycle*. Human development viewed in religious, ethical, and psychological perspectives. One course. *McCollough*

156. *Christian Marriage and the Family*. Marriage and the family in American society studied from the Christian perspective. Attention will be given to the teachings of the churches and of psychologists and sociologists concerning courtship and marriage, sex, parent-child relationships, mixed marriages, and divorce. One course. *Phillips*

158. *Psychology and Religion*. (Formerly Religion 180.) Contributions of major psychological theories to an understanding of religion, especially Christianity. One course. *Shows*

159S, 160S. *Junior-Senior Seminars: Religion and the Social Sciences*. Topics and instructors to be announced. One course.

Religion and the Humanities

170. *Problems of Religious Thought*. (Formerly Religion 144.) Analysis of credentials for belief in God. One course. *Langford and Poteat*

172. *Religion and Tragedy*. The metamorphoses of the tragic view of life in relation to the Judaic-Christian religious tradition. One course. *Poteat*

174. *Religion and the Poetics of Vision*. The liturgical shaping of life as embodied in selected works of painting and sculpture. One course. *Poteat*

187. *Religious Values in Classical and European Literature*. A consideration of the religious insights, explicit and implied, in representative writings. One course. *Kort*

188. *Recent Literature and its Religious Implications*. Religious elements in recent literature. One course. *Kort*

189S, 190S. *Junior-Senior Seminars: Religion and the Humanities*. Topics and instructors to be announced. One course.

Independent Study

191, 192. *Independent Study*. With departmental approval. One course. *Staff*

193, 194. *Independent Study*. With departmental approval. One course. *Staff*

For Seniors and Graduates

210. *Contemporary British Theology*. Selected problems in representative British theological writings after 1900. One course. *Langford*

228. *Theology of the Gospel and Epistles of John*. A study of the origin of these writings, the provenance of their thought forms and

symbolism, their influence on the early church, and their contemporary significance. One course. *Price*

231. *Religion and Contemporary Thought*. Polanyi, Arendt, Trilling, and others, with appraisal of their relevance to theological inquiry. One course. *Poteat*

248. *Theology of Karl Barth*. A historical and critical study of Barth's theology. One course. *Osborn*

280. *The History of Religions*. A study of the methodology of the history of religions, the nature of religious experience, and specific categories of religious phenomena. One course. *Partin*

281. *Phenomenology and Religion*. Scheler, E. Straus, Merleau-Ponty, Ricoeur, Binswanger, or others; their bearing upon religious knowledge and practice. One course. *Poteat*

283. *Religions of East Asia*. Major traditions of China and Japan; emphasis on Buddhism. One course.

284. *The Religion and History of Islam*. Origins and development of the Islamic community and tradition, with particular attention to the religious element. One course. *Partin*

285. *Religions of India*. The main sources and major traditions of the religions of the Indian sub-continent, with particular attention to the historical development and religious structures of Hinduism. One course.

293. *Sociological Analysis of Religion*. Components of a religion (belief-systems, liturgical practices, ethical teachings, institutional structure, and modes of operation) as they function in relation to social cohesion, social conflict, and social reform. One course. *Clark*

294. *Institutional Analysis of Religious Bodies*. Internal structure and dynamics of religious groups. One course. *Clark*

295. *Ethics and Economic Life*. Historical teachings of the Christian churches in the area of economic life, contemporary norms of economic justice, and current public and private economic policies and policy-making processes. One course. *Clark*

Departmental Major

Major Requirements.

1. Religion 100 (to be taken in the semester after declaring a major).
2. Six courses in at least three of the five areas of the curriculum. (One course numbered below 100 may count as part of the major requirement: 50, 52, or 55 in the area of biblical studies, 57 in history of religions, and 59 in any of the three remaining areas.)
3. One Junior-Senior Seminar or one 200-level course, which will count as one of the six required courses.

The department offers work leading to graduation with distinction (see the section on Graduation with Distinction in this *Bulletin*). To

qualify for distinction a major must concentrate in one area of the curriculum under the guidance of an adviser.

Reserve Officers Training Program

Air Force Aerospace Studies

Professor Barre, Lt. Colonel, USAF, *Chairman*; Associate Professor Scott, Major, USAF, *Director of Undergraduate Studies*

Eligibility Requirements. Freshmen enrolled in Trinity College and the School of Engineering are eligible to enroll in the General Military Course in the Air Force ROTC. For enrollment in the Professional Officer Course the student must have successfully completed either the General Military Course or the six weeks Field Training Course; must execute a written agreement with the government to complete the Professional Officer Course; must be sworn into the Enlisted Reserve; and he must agree to accept a commission in the United States Air Force Reserve upon graduation.

Deposit Required. Each student must make a deposit of twenty dollars with the Bursar's Office to ensure return of all government property.

Course of Study. The course of study of AFROTC is composed of courses in the Department of Air Force Aerospace Studies. In addition to classroom instruction, the Air Force requires Leadership Laboratory each semester.

General Military Courses

First Year

AS 1. *Leadership Laboratory.*

AS 2. *Defense of the United States.* A study of the causes of world conflict, the problem of United States security, and the role of the armed forces as instruments of national policy. (May not be counted to satisfy graduation requirements.) Half-course. *Lohner*

Second Year

AS 51. *World Military Systems.* A comparative study of free world military forces, Communist military systems, and trends in the development and employment of military powers. (May not be counted to satisfy graduation requirements.) Half-course. *Lohner*

AS 52. *Leadership Laboratory.*

Professional Officer Courses

All students selected to continue Aerospace Studies pursue:

First Year

AS 101, 102. *Growth and Development of Aerospace Power*. A study of development of aerospace power in the United States; mission and organization of the Defense Department; Air Force concepts, doctrine, and employment; astronautics and space operations; future development of aerospace power. Leadership Laboratory is required. Two courses. *Barre*

Second Year

AS 203. *The Problems of Flight and the Aerospace Sciences of Weather and Navigation*. For pilot and navigator cadets, elective for all others. Half-course. *Lohner*

AS 205, 206. *The Professional Officer*. Studies of the principles of leadership and management and their professional application. Final portion of the first semester is devoted to the Military Justice system. Leadership Laboratory is required. Two courses. *Scott*

Naval Science

Professor Cocowitch, Captain, U.S. Navy, *Chairman*; Associate Professor Jobe, Commander, U.S. Navy, *Director of Undergraduate Studies*; Assistant Professors: Ram, Major, U.S. Marine Corps; Barker, Lieutenant, U.S. Navy; Renager, Lieutenant, U.S. Navy; Thach, Lieutenant, U.S. Navy; Martin, Lieutenant Commander, U.S. Navy

Standardized titles and numbers for courses are established by the Bureau of Naval Personnel for use at the NROTC institutions. The first digit indicates the year of the course; the second digit (O) indicates that it is given on a semester basis; the third digit indicates the semester of the school year in which offered. Specialized courses for Marine Corps Officer candidates are indicated by the letter *M* after the number, and substitute for the basic course of the same number.

Note: Completion of all Naval Science Courses listed is required for a commission. A maximum of four Naval Science Courses may be offered as electives in satisfying degree requirements in Trinity College; only two Naval Science Courses (junior or senior level) can be so offered in the School of Engineering.

NS 101. *Principles of Naval Organization and Management*. Management practices and concepts; lines of command and control; organization for logistics, service and support; major components of the Navy and Marine Corps shipboard organization. *Thach*

NS 102. *Naval Ships Systems*. Structure, elements of design, stability,

control, compartmentation, communications, and propulsion systems as they bear on safe operation and combat or service effectiveness. *Thach*

NS 201-202. *Drills; Seapower and Maritime Affairs Seminar*. Strategic, tactical and diplomatic aspects of seapower. Weekly military drill required. No credit. *Renager*

NS 301. *Navigation*. Theory, principles and procedures of ship navigation, movements and employment. Dead reckoning, piloting, electronic and celestial navigation. *Barker*

NS 302. *Naval Operations*. Components of general naval operations, including concepts and application of tactical formations and dispositions, relative motion, maneuvering board and tactical plots, rules of the road, and naval communications. *Barker*

NS 401. *Naval Weapons Systems I*. Dynamics of the basic components of weapons control systems stated as transfer functions. Techniques of linear analysis of ballistics and weapons. Basic principles of modern naval weapons systems. Prerequisites: N.S. 301, 302. *Martin*

NS 402. *Naval Weapons Systems II*. Principal phases and solutions of weapons control problems, including propulsion systems, trajectories, flight paths, and damage criteria. Evaluation of Weapons Components. NROTC students who have not completed calculus will be offered a slightly modified course. Prerequisites: 401. *Martin*

NS 301M. *Evaluation of the Art of War*. Evaluation of weapons, strategy, tactics, and material of war; modern tactical principles and techniques, especially on the small units level. *Ram*

NS 401M. *Amphibious Warfare*. History and development of amphibious warfare. Study of selected amphibious operations. *Ram*

Nursing

The nursing program is published separately in the *Bulletin of the School of Nursing*. (See inside of front cover.)

Romance Languages

Professor Fein, *Chairman*; Assistant Professor Ripley, *Director of Undergraduate Studies in French*; Professor Davis, *Director of Undergraduate Studies in Spanish*; Associate Professor Hull, *Supervisor of Language Instruction*; Professors Chcrpack, Dow, Fowlie, Grant, Predmore, Tétel, and Wardropper; Associate Professors Cordle, Torre, and Vincent; Assistant Professors Barlow, Bryan, Cox, Hogsett, Miller, Murray, and Tate; Instructors Bean, Bybee, Colford, Dunaway, Fong, Frasure, Garnica, Geoghegan, Humphrey, LeGoff, Leibowitz, Maddox, Scott, Viti, and Windham; Visiting Assistant Professors Cypess and Stadter

French 63-64 and Spanish 63-64 or equivalent are the prerequisites for all elective courses. Students who, by reason of foreign residence, have had special opportunities in French or Spanish must be classified by the Director of Undergraduate Studies.

French

1-2. *Elementary French*. Introduction to understanding, speaking, reading, and writing French. Audiolingual techniques are combined with required recording-listening practice in the language laboratory. (Special sections designated with an X are for those students with one or two years of secondary school French who do not qualify for French 63 or 64). Two courses. *Tate and Staff*

63. *Intermediate French*. Intensive grammar review and training in reading; laboratory practice. One course. *Vincent and Staff*

64. *Intermediate French*. Open to students who have passed French 63 or by special placement. Readings in contemporary literature; practice in composition. One course. *Vincent and Staff*

64P. *Preceptorial*. Elective preceptorial for students enrolled in French 64.

91, 92. *Introduction to French Literature*. An introduction to the major writers of the French literary tradition. Selections and complete works of poetry, fiction, theater, and essay. In the first semester: Middle Ages through the eighteenth century. In the second semester: nineteenth and twentieth centuries. Lectures and discussions; short essays and tests. Conducted in French. Two courses. *Fowlie and Staff*

91P, 92P. *Preceptorial*. Elective preceptorials for students enrolled in French 91, 92.

93S. *French Literature*. Topics to be announced. Fall semester. Open to freshmen and sophomores. One course. *Staff*

94S. *French literature*. Topics to be announced. Spring semester. Open to freshmen and sophomores. One course. *Staff*

97. *Spoken French*. Intensive instruction in the spoken language: contemporary French prose provides the basis for vocabulary building and for practice in structural patterns. Limited to fifteen students. One course. *Dow and Staff*

98. *French Phonetics*. Sounds, rhythm, intonation. Individual practice in language laboratory. Readings in phonetic theory. One course. *Hull*

100. *Masterworks of French Literature*. An intensive study of selected works of French Literature with special emphasis on developing critical techniques. Open only to freshmen, through the Advanced Placement Program or by invitation of the department. One course. *Hogsett*

104S. *The Sixteenth Century*. An introduction to the spirit of the French Renaissance as reflected in the literature of the age of Rabelais

and Montaigne, Ronsard, and Du Bellay. One course. *Vincent and Tétel*

105. *Explication De Textes*. A study of the French method of textual analysis, with selections primarily from the nineteenth and twentieth century authors. For students who have taken 91 and 92. One course. *Fowlie*

108. *French Romanticism*. The beginnings of the modern era, in its quest for new values and a new expression, as studied through the great lyric poets and prosodists of the first half of the nineteenth century. Readings from Chateaubriand, Lamartine, Musset, Hugo, Vigny, and others. One course. *Grant and Ripley*

109. *Toward Modernism in French Poetry*. An introduction to modern trends in the nineteenth century: emergence from traditional Romanticism; Art for Art's Sake and the Parnassians (Gautier, Leconte de Lisle); the transition from Decadence to Symbolism (Baudelaire, Verlaine, Rimbaud, and Mallarme). One course. *Barlow*

111. *French Drama of the Nineteenth Century*. A survey of the French theatre from the Romantic period to the *Théâtre libre*. One course. *Dow*

112. *French Drama of the Twentieth Century*. Reading of representative plays selected from the works of Bernstein, Maeterlinck, Romain, Sarment, Vildrac, J.-J. Bernard, Claudel, Lenormand, Pagnol, Giraudoux, Anouilh, and others. One course. *Dow*

114S. *Diderot*. Diderot as critic, philosopher, and novelist; his techniques of paradox, dialogue, and "cas-limite"; his role in the publication of the *Encyclopédie*. One course. *Hogsett*

115. *The Nineteenth-Century Novel*. Intensive study of selected novels from the works of Stendhal, Balzac, Flaubert, and Zola. Not open to students taking French 221 or 222. One course. *Grant*

117. *Masterpieces of French Medieval Literature*. Lyric poetry, epic, romance, and theater from beginning to the Middle French period. One course. *Ripley*

119. *French Drama of the Seventeenth Century*. The plays of Corneille, Racine, and Molière are used to explore tragedy and comedy. One course.

120. *Seventeenth-Century Poetry, Novel, and Rhetoric*. Analysis of form and thought in selected works of La Fontaine, Mme. de La Fayette, Pascal, La Rochefoucauld, and La Bruyère. One course. *Cherpack*

121. *The French Enlightenment*. Religion, politics, and philosophic and literary ideas of eighteenth century France. Montesquieu, Voltaire, Rousseau, and others. One course. *Tate*

122. *The Novel in the Eighteenth Century*. Theory and practice of prose fiction as seen in selected works of Marivaux, Prevost, Diderot, Rousseau, and Laclos. One course. *Hogsett*

127. *Advanced Composition and Conversation*. A systematic review of

grammar; frequent oral and written reports. Attention to the problems of pronunciation and diction. Prerequisite: French 97 or consent of the instructor. One course. *Bryan*

133, 134. *Contemporary French Life and Thought*. Major writers of the twentieth century and their historical and cultural circumstances. First semester: Claudel, Gide, Valéry, Proust, Apollinaire, Mauriac, Romain, Cocteau. Second semester: Giono, Breton, Aragon, Malraux, Sartre, Beckett, Camus, Robbe-Grillet. Two courses. *Cordle*

181, 182. *French*. An intensive introduction to the language and literature. Open only to students who have achieved proficiency in another language. Two courses. *Ripley*

181P, 182P. *Preceptorial*. Elective preceptorials for students enrolled in French 181, 182.

191, 192. *Independent Study*. Directed reading and research. Open only to highly qualified juniors by permission of the department. Two courses.

193, 194. *Independent Study*. Directed reading and research. Open only to highly qualified seniors by permission of the department. Two courses.

209. *Advanced Composition and Syntax*. Comparative English-French stylistics. Practice in controlled and free writing. One course. *Hull*

210. *The Structure of French*. Modern French phonology, morphology, and syntax. Readings in current linguistic theory. One course. *Hull*

213. *French Literature of the Seventeenth Century*. Its initial phase. Readings in the major literary works to the middle of the century. One course. *Cherpack*

214. *French Literature of the Seventeenth Century*. Its "classical" phase. Readings in the major literary works from the middle to the end of the century. One course. *Cherpack*

217. *Mallarmé and Rimbaud*. The symbolism and the formal elements of Mallarmé's poetry. The poetic theory and the psychic elements in Rimbaud's poetry. One course. *Fowlie*

219. *Old French Literature*. An introduction to the reading of medieval French literary texts. One course. *Vincent*

221. *The Nineteenth-Century French Novel*. The initial phase. The Romantic hero in conflict with society, with special emphasis on the works of Stendhal and Balzac. One course. *Grant*

222. *The Nineteenth-Century French Novel*. A continuation of 221. The decline of the individual hero. Flaubert and Zola will receive intensive study. One course. *Grant*

223. *French Literary Criticism*. A history of critical theory in France and a study of the major critics from the Renaissance to today. One course. *Fowlie*

224. *History of the French Language*. The evolution of French from

Latin to its present form; integral developments and external influences. One course. *Hull*

225, 226. *From Renaissance to Baroque in French Literature of the Sixteenth Century*. First semester: literary prose. Readings from Jean Lemaire de Belges, Marguerite de Navarre, Rabelais, Montaigne, and others. Second semester: poetry and theater. Readings from Marot, Scève, Labé, Saint Gelais, the *Pléiade*, d'Aubigné, Sponde, Du Bartas, Garnier, and others. Two courses. *Tétel*

228. *French Poetry of the Twentieth Century*. In the wake of symbolism: Valéry and Claudel; poetry as ritual: Péguy; Apollinaire and surrealist poetry; the contemporary movement: Michaux, Char, Saint-John Perse. One course. *Fowlie*

233. *Contemporary French Theatre*. A study of dramatic theory; the art of the leading directors; and the major texts of Claudel, Giraudoux, Anouilh, Sartre, Beckett, Ionesco, and Genet. One course. *Fowlie*

234. *Proust*. A study of *A la recherche du temps perdu*. The thematic structure and the aesthetics of the work. This course is designed for graduates, but may be taken by qualified seniors and by a limited number of juniors with the permission of the instructor. One course. *Fowlie*

236. *Baudelaire*. A study of the poetry and criticism of Baudelaire as contributing to the origins of modern art and literature. One course. *Fowlie*

241, 242. *French Literature and Thought in the Age of Enlightenment*. First semester: the new philosophy and its propagation. Second semester: the crisis in literary aesthetics. Two courses. *Cherpack*

245. *French Literature of the Twentieth Century: to 1935*. Emphasis on Gide, Mauriac, and Malraux. One course. *Cordle*

246. *French Literature of the Twentieth Century: after 1935*. Emphasis on Sartre, Camus, and the *nouveau roman*. One course. *Cordle*

Italian

1-2. *Elementary Italian*. Introduction to understanding, speaking, reading, and writing. Audiolingual techniques are combined with required recording-listening practice in the language laboratory. Two courses. *Stadter*

63. *Intermediate Italian*. Intensive grammar review and training in reading; laboratory practice. One course. *Windham*

64. *Intermediate Italian*. Open to students who have passed Italian 63 or by special placement. Readings in contemporary literature; practice in composition. One course. *Windham*

64P. *Preceptorial*. Elective preceptorial for students enrolled in Italian 64.

101, 102. *Masterworks of Italian Literature in English Translation*. First semester: Dante, Petrarch, and Boccaccio. Second semester: Ficino,

Pico, Machiavelli, Tasso, Galilco, Renaissance and Baroque poetry, Leopardi, Verga, Svevo, and Pirandello. Two courses. *Stadter*

181, 182. *Italian*. Intensive introduction to the language. Modern readings. Completion of the second college year of another foreign language will normally be required as a prerequisite. Two courses. *Tétel*

181P, 182P. *Preceptorial*. Elective preceptorials for students enrolled in Italian 181, 182.

183, 184. *Readings in Italian Literature*. First semester: Dante, Petrarch, and Boccaccio. Second semester: Machiavelli, Ariosto, Tasso, and Renaissance and Baroque poetry. Prerequisite: Italian 63-64 or 181-182. Two courses. *Staff*

191, 192. *Independent Study*. Directed reading and research for juniors. Two courses. *Staff*

193, 194. *Independent Study*. Directed reading and research for seniors. Two courses. *Staff*

284. *Dante: La Vita Nuova* and a close reading of the *Inferno*. The course will be conducted in English. Reading in Italian or English. One course. *Fowlie*

288. *The Renaissance*. Petrarch, Boccaccio, and Ariosto. One course. *Tétel*

Portuguese

181-182. *Portuguese*. Intensive introduction to the language. Modern readings. Completion of the second year of another foreign language will normally be required as a prerequisite. Two courses. *Miller*

185, 186. *Conversation*. Intensive practice in spoken Brazilian Portuguese. Prerequisite: Portuguese 181-182 or permission of the instructor. Half-course. *Miller*

Spanish

1-2. *Elementary Spanish*. Introduction to understanding, speaking, reading and writing Spanish. Audiolingual techniques are combined with required recording-listening practice in the language laboratory. (Special sections, designated with an X are for students with one or two years of secondary school Spanish who do not qualify for Spanish 63 or 64). Two courses. *Miller and Staff*

63. *Intermediate Spanish*. Intensive grammar review and training in reading, laboratory practice. One course. *Cox and Staff*

64. *Intermediate Spanish*. Open to students who have passed Spanish 63 or by special placement. Readings in contemporary literature; practice in composition. One course. *Cox and Staff*

64P. *Preceptorial*. Elective preceptorial for students enrolled in Spanish 64.

91, 92. *Introduction to Spanish Literature*. An introduction to the major writers of the Spanish literary tradition. Selections and complete works of poetry, fiction, theater, and essay. First semester: Middle Ages through the eighteenth century. Second semester: nineteenth and twentieth centuries. Conducted in Spanish. Prerequisite: Spanish 63-64 or equivalent. Two courses. *Staff*

91P, 92P. *Preceptorial*. An elective preceptorial for students enrolled in Spanish, 91, 92. *Staff*

93S. *Spanish Literature*. Topics to be announced. Fall semester. Open to freshmen and sophomores. One course. *Staff*

94S. *Spanish Literature*. Topics to be announced. Spring semester. Open to freshmen and sophomores. One course. *Staff*

97. *Spoken Spanish*. Intensive instruction in the spoken language: contemporary Spanish prose provides the basis for vocabulary building, and for practice in structural patterns. Does not satisfy the minimum uniform requirement. Limited to fifteen students. Prerequisite: Spanish 64 or equivalent. One course. *Staff*

117. *Masterpieces of Spanish Medieval Literature*. Selected works of the Medieval period. One course. *Murray*

155. *Spanish American Short Fiction*. Novelettes and short stories of the twentieth century. One course. *Fein*

156. *The Spanish American Novel*. Masterworks of the nineteenth and twentieth centuries. One course. *Fein*

161. *Spanish Literature of the Renaissance and the Baroque*. A study of selected works of the sixteenth and seventeenth centuries with attention to their reflection of social, religious, and political ideas. One course. *Miller and Cox*

162. *Spanish Romanticism*. A study of the romantic spirit in modern Spanish literature. One course. *Torre*

163. *The Generation of 1898*. Special emphasis on the novel and essay. The precursors: "Clarín and Galdós; Unamuno, Baroja, "Azorín," Valle-Inclán; influence on the next generations; Pérez de Ayala and Ortega y Gasset. One course. *Predmore*

164. *Topics of Spanish Civilization*. Study of the problems of Spanish history from the beginnings of the nation to the consequences of the Civil War. One course. *Staff*

165. *Analysis of Great Spanish Authors*. A close textual study of a few literary texts with some considerations of methods of literary criticism. The course is designed to give the student insight into various ways of interpreting and understanding literary works so that his experience of literature in general may be enriched. One course. *Wardropper*

166. *Spanish Realism*. The growth of realism in Spanish literature of the nineteenth century. One course. *Davis*

167. *Golden Age Literature: Cervantes*. Emphasis on *Quijote*. One course. *Predmore*

168. *Survey of Eighteenth Century Spanish Literature*. Prose, poetry, and drama reflecting social, religious, and political ideas of the eighteenth century. One course. Cox

169. *Literature of Contemporary Spain*. Trends in the post-Civil War novel, theater, and poetry. One course. Cypess

176. *Advanced Conversation*. This course is designed to develop facility of expression through constant drill on vocabulary and conversational idiom. Time will be devoted to a review of the essentials of Spanish syntax. Prerequisite; Spanish 97 or permission of the instructor. One course. Torre

177. *Advanced Composition and Syntax*. Study of fundamental difficulties in the language; practice in writing idiomatic Spanish; exercises in translation from English to Spanish. For students who have a satisfactory command of Spanish grammar and fair conversational ability. Prerequisites: Spanish 176 or permission. One course. Davis

181, 182. *Spanish*. An intensive introduction to the language open only to students who have achieved proficiency in another language. Two courses. Miller

181P, 182P. *Preceptorial*. Elective preceptorial for students enrolled in Spanish 181, 182.

191, 192. *Independent Study*. Directed reading and research. Open only to highly qualified juniors by permission of the department. Two courses.

193, 194. *Independent Study*. Directed reading and research. Open only to highly qualified seniors by permission of the department. Two courses.

251. *The Origins of the Spanish Novel*. A critical study, based on close readings and discussions, of selected examples of the principal genres of the early novel: *Amadis de Gaula*, Diego de San Pedro's *La cárcel de amor*, the *Abencerraje*, the *Lazarillo*, Montemayor's *Diana*. One course. Wardropper

252. *Spanish Lyric Poetry Before 1700*. A critical study, based on close reading and discussion, of selected poems of the Middle Ages, Renaissance, and Baroque. Special emphasis on the *Razón de amor*, la *poesía de tipo tradicional*, and *Santillana*; on Garcilaso, San Juan de la Cruz, Fray Luis de León, and Herrera; on Góngora and Quevedo. One course. Wardropper

253. *The Origins of the Spanish Theatre*. A study of the evolution of the Spanish theater from the *Auto de los Reyes Magos* (twelfth century) to the end of the sixteenth century. The idea of the theater as dramatic poetry will be stressed; close reading of texts by Gómez Manrique, Encina, Gil Vicente, Torres, Naharro, Lope de Rueda, Juan de la Cueva. One course. Wardropper

255. *Modern Latin-American Poetry*. The coming of age of Latin American poetry in the nineteenth and twentieth centuries. One course. Fein

256. *Contemporary Latin-American Literature*. Trends in Latin American literature after the Modernist movement. Analysis of significant works in various genres. One course. *Fein*

257. *Old Spanish Language*. The historical development of the language. Illustrative readings. One course. *Davis*

258. *Old Spanish Literature*. An introduction to the reading of medieval Spanish literary texts. One course. *Davis*

259. *Spanish Phonetics*. A phonemic approach to the study of Spanish sounds. Remedial pronunciation drills with special emphasis on rhythm and intonation. Readings in current studies of phonology. Prerequisite: Spanish 176 or permission. One course. *Predmore*

261. *Nineteenth-Century Novel*. A study of literary trends in the last half of the nineteenth century. Readings will be selected from the novels of Valera, Pereda, Galdós, Pardo Bazán, Blasco Ibáñez, and their contemporaries. One course. *Davis*

265. *Golden Age Literature: Cervantes*. The life and thought of Cervantes with special emphasis on his *Quijote*. One course. *Predmore and Wardropper*

266. *Golden Age Literature: The Drama*. A study of the chief Spanish dramatists of the seventeenth century with readings of representative plays of this period. One course. *Wardropper*

275. *Contemporary Spanish Literature: Essay and Lyric Poetry*. A study of the revision of national values and literary expression in the twentieth century with particular reference to the crisis of 1898 and to the enrichment of the Spanish tradition through extrapeninsular influences. One course. *Predmore*

276. *Contemporary Spanish Literature: Novel*. A study of tradition and innovation in the twentieth century Spanish novel with emphasis on the novels of Unamuno, Baroja, Valle Inclán, and Pérez de Ayala. One course. *Predmore*

Romance Languages

211. *Approaches to Romance Literature*. One course. *Cherpack*

218. *The Teaching of Romance Languages*. Evaluation of objectives and methods; a study of the practical problems involved in teaching these languages on the elementary, secondary, and college level; analysis of textbooks, special foreign language programs, audiovisual aids; critical examination of modern techniques in written and oral testing. One course. *Dow*

Departmental Major

Prerequisite: French or Spanish 64 or proficiency.

Major Requirements: Literature Major: a total of eight courses (above

64), no fewer than five literature courses, and no fewer than two language courses. The literature courses must represent at least three of the six historical periods (Medieval, Renaissance, seventeenth, eighteenth, nineteenth, twentieth centuries for French and Medieval, Renaissance, seventeenth, nineteenth, twentieth, and Spanish American, for Spanish.)

Language Major: A total of eight courses, no fewer than four language courses (for French, from 97, 98, 127, 209, 210; for Spanish, from 97, 176, 259, 260) and no fewer than two literature courses.

In order to give perspective to a student's program, majors in Romance Languages will normally select, with the approval of the major adviser, appropriate courses from such fields as: (1) other languages and literature; (2) history; (3) philosophy; (4) appreciation courses in music and art; and (5) linguistics.

Russian

For courses in Russian, see *Slavic Languages and Literatures*.

Slavic Languages and Literatures

Associate Professor M. J. Krynski, *Chairman*; Assistant Professor H. Pavlov, *Director of Undergraduate Studies and Supervisor of Language Instruction*; Associate Professors B. Jezierski and M. Apte; Assistant Professor M. Pavlov

1-2. *Elementary Russian*. Introduction to understanding, speaking, reading and writing. Audiolingual techniques are combined with required recording-listening practice in the language laboratory. Two courses. *Staff*

63-64. *Intermediate Russian*. Intensive classroom and laboratory practice in spoken and written patterns. Reading in contemporary literature. Prerequisite: Russian 1-2, or two years of high school Russian. Two courses. *Staff*

91. *Introduction to Russian Literature of the Nineteenth Century*. Conducted in Russian. Prerequisite: Russian 63-64 or equivalent. One course. *M. Pavlov*

92. *Introduction to Russian Literature of the Twentieth Century*. Conducted in Russian. Prerequisite: Russian 91. One course. *M. Pavlov*

101, 102. *Russian Literature and Culture Through the Nineteenth Century*. Russian prose, poetry, and criticism, with special attention to recent periods. Readings (from *The Igor Tale* to Blok) in English. Lectures and class discussion. Two courses. *Jezierski*

105. *The Russian Theatre and Drama*. Russian drama from its be-

ginnings to the present. Readings in English or Russian. One course.
Jezierski

179. *Twentieth-Century Russian Prose*. Modern prose in the original. Textual analysis of Russian prose since the turn of the century. Prerequisite: Russian 1, 2, 63, 64, or permission of instructor. One course.
Krynski

180. *Masterpieces of Russian Literature of the Nineteenth Century*. Poems, plays, and prose by such authors as Pushkin, Turgenev, and Chekhov in the original. Prerequisite; permission of instructor. One course.
Krynski

181. *Modern Russian Poetry*. The historical development of modern Russian poetry. Representative works of major recent Russian poets include Blok, Axmatova, Pasternak, Mandelstam, and Voznesenky. Prerequisite: at least three semesters of Russian or permission of instructor. One course.
Jezierski

191, 192. *Independent Study*. Directed reading and research. Open only to highly qualified students by permission of the department. (See section on Eligibility for Special Programs.) Two courses.

201, 202. *The Novelists of Nineteenth-Century Russia*. Development of the Russian novel against the European background, with emphasis on Dostoevsky and Tolstoy. Extensive readings in English or Russian. Two courses.
Krynski

204. *Polish Literature of the Twentieth Century*. Readings in English of Polish novels, plays, and poems, from the beginning of the century through the sixties. Emphasis on the avant-garde works of the liberal period after 1955. One course.
Krynski

205. *The Structure of Polish in Relation to Russian*. Comparative and contrastive study of the two major Slavic languages. Emphasis on preparing students to read Polish literary texts. Carries graduate credit. One course.
Krynski

206. *Readings in Contemporary Polish Prose in the Original*. Stylistic analysis of aphoristic prose by Stanislaw Lcc, philosophical allegories by Leszek Kolakowski and short stories by Slawomir Mrozek and Marek Hlasko. One course.
Krynski

207. *Soviet Literature and Culture*. Literature since 1917, as a continuation of nineteenth-century traditions and as a response to Soviet ideology. Readings (in English or Russian) from major works of prose, poetry, and drama. One course.
Jezierski

212. *Pushkin*. A survey of his life and works, with attention given to his role as a precursor of modern Russian literature. Readings in English or Russian. Prerequisite: Russian 101 or the instructor's permission. One course.
Krynski

215, 216. *Advanced Composition and Syntax*. Morphological and syntactic structure of modern Russian compositions based on literary topics. Prerequisite: Russian 91, 92 or permission of instructor. Two courses.
M. Pavlov

224. *The Russian Short Story—Eighteenth Century to the Present.* Such masters as Pushkin, Gogol, Turgenev, Tolstoy, Dostoevsky, Leskov, Chekhov, Gorky, Bunin, Andreyev, Babel, Zamiatin, Zoshchenko, and Kazakov. Readings in English. Majors will do part of the reading in Russian. One course. *Jezierski*

225. *Leo Tolstoy. Life and works.* One course. *Jezierski*

227. *Gogol.* Life and works; short stories, dramas, and the novel. Readings in English, but students knowing Russian will do part of the reading in that language. One course. *Jezierski*

230. *Chekhov.* Chekhov as a short story writer and his influence on the twentieth century Western short story. Close structural analysis of the plays of one of the greatest dramatists of all time. One course. *Krynski*

232. *Fyodor Dostoevsky.* The major fiction of a leading nineteenth century Russian writer. One course. *Jezierski*

233. *Ivan Turgenev.* Novels, short stories, and drama of the great exponent of classical realism. One course. *Krynski*

236. *Russian and Polish Romanticism.* Prose, poetry, and drama of such major writers as Pushkin, Lermontov, Mickiewicz, and Krasinski against the background of the Romantic movement in Western Europe. One course. *Krynski*

Departmental Major

Prerequisite: Russian 1-2 and 63-64, or equivalent.

Major Requirement: A minimum of eight courses in the department. All majors must take the following four obligatory courses: Russian 91, 92, 215, 216, plus four courses in literature, two of which must be selected from the 200-level courses.

Students contemplating graduate work in the Slavic field may elect a more intensive program consisting of ten courses. A knowledge in depth of Russian literature, or some knowledge of Polish language and/or literature, will facilitate admission to graduate school and subsequent study in the field.

Sociology and Anthropology

Professor Tiryakian, *Chairman*; Professor Roy, *Director of Undergraduate Studies, Sociology*; Assistant Professor Crocker, *Director of Undergraduate Studies, Anthropology*; Professors Back, Kerckhoff, La Barre, Maddox, McKinney, Myers, Preiss, and Smith; Associate Professors Apte, Fox, and Palmore; Assistant Professors Bowers, Brehm, Hartford, Murch, O'Barr, Wilson, and Baylis; Lecturer Simpson

Sociology

Sociology 91 or special permission of the instructor or the Director of Undergraduate Studies, is a prerequisite for all sociology courses at the 200-level.

To provide a variety of educational experiences for the beginning student of sociology, the introductory course, *Introduction to Sociology: Concepts and Procedures*, has a variety of structures. In each, however, students learn basic approaches of sociology to social reality and some of the problems involved in observing, describing, and analyzing facets of social life.

91. Sections of limited enrollment (maximum thirty-five). One course. *Staff*

91D. Two lectures and one discussion section (no more than twenty students per section). One course. *Staff*

91S. Taught as seminar, limited enrollment, open to invited freshmen only. *Simpson*

132. *Introduction to Sociological Research*. Application of theories and methods of sociology; examination of several empirical studies dealing with social behavior. One course. *Preiss and Wilson*

136. *Sociology of Modern Africa*. An introduction to the modernization of sub-Sahara Africa. Primary emphasis given to the nature and formation of colonial society, as well as to process of decolonization and its sources. One course. *Tiryakian*

139. *Comparative Social Structure*. Comparison of social phenomena in two or more societies. Sociological propositions, tested with American data and data from other societies. One course. *Murch and Wilson*

141. *Introduction to Population and Human Ecology*. This course provides an introduction to two macroscopic aspects of society. Both the size, distribution, and composition of populations, and the morphological aspects of collective life are considered. One course. *Hartford and Myers*

142. *The Sociology of Mass Communication*. An analysis of the role of radio, the press, magazines, movies, and television in modern societies. An examination of the selective audiences, content characteristics, controlling elements, and organizational structure of the various media of mass communication. One course. *Smith*

143. *Deviant Social Behavior*. Analysis of deviant behavioral systems (illness, crime, delinquency) in terms of (a) precipitating social factors, (b) patterns and goals, (c) remedial and counteracting controls. One course. *Preiss*

144. *Political Sociology*. Politics as social behavior involving change in institutions and structures; current national and local issues. One course. *Preiss*

145. *Urban Sociology*. Historical, demographic, and ecological ma-

terials are used to study urban society with respect to its institutions, interaction patterns, differentiation, integration disorganization, and decentralization. One course. *Smith*

146. *Industry and Society*. A study of industrial institutions in their interrelationships with other forms of social behavior in the broad cultural setting of Western civilization. Attention will center upon analysis of specific social problems resulting from the impact of industrial change. One course. *Roy*

150. *The Family*. Analysis of the American family as an institutionalized group and its relationship with other institutions and structural features such as social class and ethnic group. Special attention is devoted to methods of research in this area. One course. *Kerckhoff and Roy*

151. *Sociology of Religion*. The religious factor in society and the social factor in religion. Major sociological theories and selected research studies. One course. *Tiryakian and Wilson*

154S. *The Sociology of the Arts*. An analysis of the social relations of the world of the arts (painting and sculpture, music, and literature) with emphasis upon creative artists, art publics, art organizations, and art works as they function in their social-cultural milieux. One course. *Back*

155. *Introduction to Industrial Sociology*. An analysis and appraisal of the various factors that affect human relations in industry. The interpersonal and intergroup relationships within the individual industrial unit which determine its efficiency as an economic and social institution and the social conditions in the community as they affect social relations. One course. *Roy*

159. *The Negro in America*. A study of the history and changing status of the Negro regarded as a symbol and protagonist of minority groups in America and elsewhere. One course. *Palmore*

172. *Collective Behavior and Social Movements*. Examination of disruptive and relatively unorganized aspects of social phenomena such as crowd behavior, fads, rumors, crazes, and social movements as indexes of social disequilibrium and potential sources of social change. One course. *Kerckhoff*

185, 186. *Junior Tutorial*. Prerequisites: Sociology 91 (or 91D or 91S) and permission of the Director of Undergraduate Studies. Half-course or one course. *Staff*

193, 194. *Independent Study*. Graduation with distinction in the department requires a minimum of one course credit. Open to qualified students in the junior and senior years by permission. Two courses. *Staff*

195S, 196S. *Senior Seminar on Special Topics*. Two courses. *Staff*

241. *Social Stratification*. The nature of hierarchical and vertical differentiation in the economic, political, and prestige structures in modern

societies. The interrelationship of class, status, and power strata and their influence on social institutions, personality structure, and group and individual behavior. One course. *Roy*

242. *The Sociology of Occupations and Professions*. The social significance of work. Analysis of forces changing the contemporary occupational structure, typical career patterns of professions and occupations, the social organization of occupational groups. One course. *Roy*

243. *Population Dynamics and Social Change*. Introduction to demographic analysis. The relationship between the demographic structure of society and its social organization. One course. *Hartford and Myers*

251. *The Sociology of Modernization*. Changes, obstacles to change, and structural strains which occur in kinship, stratification, and bureaucracy, and the role of the military, occupations and works, communications, values, and ideologies during modernization. Special reference to Asian societies. One course. *Tiryakian and Murch*

253. *Social Institutions*. The study of particular institutions and the social movements out of which they developed, with emphasis on the development of general propositions concerning the nature, function, and importance of institutions in society. One course. *Staff*

255. *Race and Culture*. A comparative study of race relations in world perspective developed around such themes as race and personal identity, the geography and ecology of race relations, the idea of race, and race conflict. One course. *Staff*

259. *Religion and Social Change*. The role of religion in significant social changes in Western and non-Western societies; non-institutional phenomena (charisma, prophecy, messianism, revivals, glossolalia). Prerequisite: either Anthropology 264, Sociology 151, or the equivalent. One course. *Tiryakian and Wilson*

272. *The Socialization Process*. Universal societal requirement for continual replacement of socialized personnel. Variations in socialization by position in the social structure (class, caste, urban-rural) and contributions made by various socialization agencies (family, school, peer groups, mass media). Western society is the focus of study. One course. *Kerckhoff*

275. *Social Attitudes and Individual Behavior*. Such issues as the following are considered: the importance of symbolic interaction, the development of the "Self," the social structuring of the socialization process, individual movement within the social structure, and the importance of membership groups and reference groups. One course. *Back and Kerckhoff*

278. *Social Structure and the Life Cycle*. A study of the relationship between age as a social characteristic and social interaction, with particular reference to adolescence and old age. One course. *Maddox*

282S. *Principles of Sociological Analysis*. A systematic theoretical ex-

amination of the social order, focusing on its structural components and the functions they serve. One course. *McKinney, Wilson, and Murch*

295. *Methodology in Sociology*. Considerations of the nature of scientific method, as well as alternative paths to knowledge, as they apply to sociology. Conceptualization, hypothesis formation, and definition. The research process as a decision-making situation both on the general level of research design and the specific level of special techniques. The process and logic of data analysis. Relations of theory and research are stressed. One course. *Smith and Back*

297. *Statistical Analysis in Sociology*. Such techniques as zero and higher order linear and curvilinear correlation, partial correlation, analysis of variance and covariance and factorial design are studied. When possible, analogous nonparametric techniques are also considered. Prerequisite: Mathematics 233 or equivalent course or permission of the instructor. One course. *Hartford and Brehm*

Departmental Major in Sociology

Prerequisite. Sociology 91.

Major Requirements. Seven courses in the department above 91, including at least two senior-graduate courses.

A sociology major normally takes at least four related courses in departments approved by his sociology adviser. Such courses are usually in the Departments of Economics, Education, History, Mathematics, Political Science, and Psychology.

Anthropology

93. *General Anthropology*. Origins and distribution of mankind; primate evolution; a survey of human paleontology and human biology, pre-history and language; and the origins of human social organization and culture. One course. *Staff*

93D. Same course as 93 with discussion section included. One course. *Staff*

93S. Same course as 93 taught as seminar. One course. *Staff*

94. *Cultural Anthropology*. A study of the dynamics of culture and society; form and function of social institutions. Emphasis is upon primitive societies. One course. *Staff*

94D. Same course as 94 with discussion section included. One course. *Staff*

94S. Same course as 94 taught as seminar. One course. *Staff*

101, 102. *Introduction to the Civilization of Southern Asia*. (See Interdisciplinary Course 101, 102.)

121, 122. *World Ethnography*. The major cultural areas of the world

in terms of the "universal culture pattern," Ethnographic records are used to illustrate and appraise non-Western man's environment. Two courses. *Staff*

124. *Peoples of the World: American Indian*. A comprehensive survey of the Indians of North and South America, including a study of origins and pre-history, archaeology, racial affiliations, languages, material culture, social and political organization, economics, and religion, discussed in terms of the "culture area." One course. *La Barre and Stone*

125. *Peoples of the World: Africa*. A survey of the indigenous cultures and societies of Africa. Particular emphasis will be given to the study of kinship, politics, economics, religion, and sociocultural change. One course. *O'Barr*

126. *Peoples of the World: Oceania*. Selected problems in the development of pre-European and post-European cultures. The relationships between man and Pacific environments. One course. *Bowers*

128. *Peoples of the World: Asia*. A comprehensive survey focusing on the peoples and societies of South, Southeast, and East Asia, including the prehistoric, ethnic, linguistic, religious, and political foundations of the complex civilizations; the response of traditional Indian, Chinese, and Japanese cultures to the West. One course. *Staff*

130. *Cultural Change and Stability*. Contemporary theories of culture change, especially those resulting from acculturation and from implementation of programs of technical and economic aid; a consideration of the factors significant in maintaining stability or stimulating change in traditional cultures. One course. *Staff*

134. *Political Anthropology*. Comparative study of conflict and political action. Decision-making as related to social structure and cultural values. Stateless, emergent, and underdeveloped societies. One course. *Crocker and O'Barr*

137. *Comparative Social Organization*. Social anthropological analysis of role structures and corporate groups in particular societies, and their relevance for understanding the historic process of civilization. Case study of social types and of the unique features of societies revealed by the comparative method. Prerequisite: Anthropology 94 or permission of the instructor. One course. *Fox and Stone*

138. *The Analysis of Mythology and Ideology*. Relationships between social institutions and symbolic orderings as expressed in myths and cosmologies. Case materials and studies from both pre-literate and industrialized societies. One course. *Crocker*

160. *The Anthropology of Agriculture*. Origins and distribution of cultivated plants, domesticated animals, and techniques of cultivation. The major agricultural regions of the world. Man-environment relations in contemporary subsistence-oriented agricultural systems, particularly in the humid tropics. One course. *Bowers*

185S, 186S. *Junior Tutorial*. Prerequisites: Anthropology 94 and permission of the Director of Undergraduate Studies. Half-course or one course. *Staff*

193. *Independent Study*. Directed reading and research. Open only to highly qualified students in the senior year, by permission of the Director of Undergraduate Studies. One course. *Staff*

195S, 196S. *Senior Tutorial*. Prerequisites: Anthropology 94 and any two 100-level courses in anthropology, and permission of the Director of Undergraduate Studies. Half-course or one course. *Staff*

199S. *The Changing South*. (See Interdisciplinary Course 199.)

220S. *Society and Culture in India*. The basic features of Indian cultures and societies from an anthropological perspective. The impact of selected technological and social changes upon the individual, caste, and community. One course. *Fox*

222S. *Topics in African Anthropology*. Current research problems in African anthropology, illustrated by a study of tribal societies, in terms of contemporary theories about culture and society. One course. *O'Barr*

231. *Physical Anthropology*. Human evolution, primate phylogeny, paleontology of man and other primates, primate biochemical genetics, primate behavior, human variation (genetic and somatic). (Also listed as Anatomy 231 in the *Bulletin of the Graduate School*.)

232. *Human Genetics*. Particular emphasis upon the uniqueness of studies in genetics, biochemical genetics, population genetics. Prerequisites: Anatomy 231, Zoology 131 (or an elementary course in biology including genetics) or permission of instructor. (Also listed as Anatomy 232 and Zoology 232 in the *Bulletin of the Graduate School*.) One course. *Buettner-Janusch*

238S. *Language and Society*. An introduction to the study of language and society. Universal features of language, language as a mirror of society and social perception through language, language as a coding system, linguistics and anthropology, applied linguistics. One course. *Apte*

240S. *Indo-Aryan Linguistics*. Historical development of Indo-Aryan languages from Sanskrit to the modern period. A comparative analysis of modern Indo-Aryan languages as regards phonology, morphology, syntax, and lexicon. Impact of non-Indo-Aryan languages on the structure and lexicon of Indo-Aryan languages. Prerequisite: Linguistics 101 or permission of instructor. One course. *Apte*

249S. *Economic Anthropology*. Economic organization and behavior in preliterate, peasant, and transitional societies; analysis of ownership and distribution. The relationship of economic processes to norms and institutions such as markets. One course. *Crocker and Fox*

260S. *Linguistic Anthropology: Phonemics*. Application of descriptive linguistics to analysis of language; concentration on the sound system of a South Asian language, and other non-Western languages. Prerequisite: permission of the instructor. One course. *Apte and Baylis*

261S. *Linguistic Anthropology: Morphology and Syntax*. Application of descriptive linguistics to analysis of language; concentration on the grammatical system of a South Asian language, and other non-Western languages. Prerequisite: Anthropology 260 or permission of the instructor. One course. *Apte and Baylis*

262S. *Anthropology of Law*. Legal decision in preliterate societies. The interrelationships of law, ritual, and myth. One course. *Crocker*

263S. *Primitive Art and Music*. A comparative ethnological study of non-European art and music; sufficient technical background will be provided for non-specialist students. One course. *La Barre and Crocker*

264S. *Primitive Religion*. The ethnography, the social functions, and the socio-psychological meanings of religion in primitive societies. One course. *La Barre and Crocker*

265S. *Personality and Society*. The sociology and social psychology of human personality, its origins in the primary group, its nature and varieties, and its integrations into secondary group institutions. One course. *La Barre*

266S. *Personality and Culture*. The influence of culture patterns and social institutions upon character structure, socialization of the individual, and the dynamics of human personality. Comprehensive anthropological materials will be drawn upon. One course. *La Barre*

267S. *Analysis of Kinship Systems*. Primitive relationship categories as related to legal norms, ritual and social groupings. Theoretical issues and contrasting approaches to the analysis of social classification terminologies. One course. *Crocker*

280S, 281S. *Seminar in Selected Topics*. Special topics in methodology, theory, or area. Permission of the instructor. Two courses. *Staff*

291, 292S. *Anthropological Theory*. Theoretical, methodological, and comparative issues in anthropology. Two courses. *Crocker and Fox*

Departmental Major in Anthropology

Prerequisite. Anthropology 93-94.

Major Requirements. Six courses in the department above 93-94, including at least two senior-graduate courses.

An anthropology major normally takes at least four related courses in departments approved by his anthropology adviser. Such courses are usually in the Departments of Anatomy, Art, Botany, Economics, History, Mathematics, Political Science, Psychology, and Zoology.

Spanish

For courses in Spanish, see *Romance Languages*.

University Courses

Fall Semester

199.1. *Comparative Politics: Western Europe*. One course. Cole

199.5. *Science, Society, and Education*. One course. Kramer

Zoology

Professor Fluke, *Chairman*; Assistant Professor Doyle, *Director of Undergraduate Studies*; Associate Professor Wainwright, *Supervisor of Freshman Instruction*; Professors Bailey, Bookhout, Buettner-Janusch, Costlow, Gregg, Klopfer, Livingstone, Schmidt-Nielsen, and Wilbur; Adjunct Professor Stefansson; Associate Professors Gillham, Nicklas, Tucker, and Ward; Assistant Professors Sutherland and Vogel; Instructors Ewel and Vaughan

11-12. *An Introduction to Living Systems*. An inquiry into the common aspects of organisms; the physical and chemical bases of life, and the origin, perpetuation, evolution, and functioning of living systems. Lectures and laboratories. Two courses. Vogel and Staff

11P-12P. *An Introduction to Living Systems*. Same courses as 11-12 except preceptorials are added.

53. *Comparative Vertebrate Anatomy*. A study of the anatomy and evolution of the organ systems of vertebrates. Prerequisite: a year of college biology. One course. Staff

71. *Heredity and Society*. An introduction to genetics, with emphasis on the effects of environment and heredity upon the individual and population. A student may not receive credit for both Zoology 71 and 180. Prerequisite: a year of biology or consent of the instructor. One course. Ward

92. *General Embryology*. An introduction to the study of developmental processes. Prerequisite: a year of college biology; Zoology 53 is recommended. One course. Gregg

103. *Principles of Ecology*. An introduction to the study of organisms in natural habitats, with particular attention to the growth of animal populations, the chemical role of organisms, energy flow through food chains, and the development of ecological systems through geologic time.

Prerequisites: a year of college biology, Mathematics 17 or 21 or 31. One course (optional laboratory). *Livingstone*

109. *Evolution*. Analysis of the processes of adaptation and evolution in individuals, populations, and genetic systems. Prerequisite: genetics or consent of the instructor. (Combined course with Botany 240.) One course. *Klopfers and Stone (Botany)*

120. *Ornithology*. Lectures, laboratory, and field trips dealing with the classification, adaptations, and natural history of birds. Prerequisite: one year of biology; Zoology 53 is recommended. One course. *Bailey*

131. *Human Evolution*. Evolution of the order primates and the origins of man. Primate paleontology, biochemical genetics, primate behavior, human variation. Prerequisites: a year of biology and a course in genetics. (Combined course with Anthropology 231.) One course. *Buetner-Janusch*

151. *Principles of Physiology*. An introductory survey of physiological functions. Prerequisites: at least a year of biology and a year of chemistry. One course. *Tucker*

174. *Animal Diversity*. Animal kingdom, form, and function. Prerequisite: a year of college biology. One course. *Wainwright*

180. *Principles of Genetics*. Structure and properties of genes and chromosomes, and evolution of genetic systems. (Also listed as Botany 180, Botany 280, and Zoology 280.) Prerequisites: introductory course in biology, chemistry, and mathematics, or equivalent. One course. *Boynton, Gillham and others of the University Program in Genetics*

182. *Principles of Genetics Laboratory*. Genetic theory applied to laboratory experimentation. May only be taken with Zoology 180 or by consent of instructor. (Also listed as Botany 182.) Half-course. *Boynton and Gillham*

195S, 196S. *Undergraduate Seminars*. Three courses maximum. *Tucker and Staff*

197, 198. *Special Problems*. Senior and junior majors who have had proper training may be permitted to do special work. Permission must be obtained from the Director of Undergraduate Studies and the instructor under whom the student wishes to work. These courses maximum. *Staff*

For Seniors and Graduates

201. *Animal Behavior*. A review of the major developments in the field with emphasis on recent physiological and developmental studies. Prerequisites: physiology, genetics and evolution, or consent of instructor. One course (optional laboratory). *Klopfers*

203. *Marine Ecology*. A study of marine animals in relation to environment. Consideration of environmental factors, succession, rhythms, communities, intraspecific and interspecific relations, productivity, conserva-

tion, problems concerned with animal life in the ocean. (Given at Beaufort.) One and one-half courses. *Staff*

205. *Elements of Theoretical Biology*. An introduction to elementary mathematical biology, conceived as the study of axiomatized mathematical theories and their biological models. Prerequisites: one year each of college biology and mathematics, or consent of instructor. One course. *Gregg*

213. *Ecological Oceanography*. Population ecology and energy relationships of life in the open ocean. Lectures, seminars, and some sea-time. Prerequisites: courses in ecology or invertebrate zoology, chemistry, and calculus; differential equations is strongly recommended. One course. *Doyle*

214. *Biological Oceanography*. Composition in time and space of marine biosphere in relation to descriptive marine chemistry, physics, and geology. Some work at sea aboard the research vessel. Prerequisites: a course in invertebrate zoology, ecology, marine biology or an appropriate equivalent; chemistry through organic; one year of physics and mathematics. (Given at Beaufort.) One and one-half courses. *Staff*

216. *Limnology*. A study of lakes, ponds, and streams, including their origin, development, geochemistry, energy balance, productivity, and the dynamics of plant and animal communities living in them. Lectures, field trips, and laboratory work. Usually offered in alternate years. Prerequisites: one year each of biology, chemistry, and physics, and Mathematics 21; or permission of instructor. One course. *Livingstone*

224. *Vertebrate Zoology*. A study of life histories, adaptations, ecology, and classification of vertebrate animals. Prerequisite: Zoology 53. One course. *Bailey*

228. *Experimental Embryology*. Lectures, readings, reports, and laboratory work. One course. *Gregg*

232. *Human Genetics*. Particular emphasis upon unique applications to human beings of genetics, biochemical genetics, population genetics. Prerequisites: Zoology 131 or permission of the instructor. One course. *Buettner-Janusch*

238. *Systematic Zoology*. The fundamental theory and practice involved in the collection, identification, and classification of animals. Prerequisites: Zoology 11-12 or Biology 11-12. One course. *Bailey*

240. *Chemical Oceanography*. See Chemistry 240. (Given at Beaufort.) One and one-half courses. *Stefansson*

242. *Cytological Materials and Methods*. General cytological analysis, with emphasis on chromosome studies using current optical, cytochemical, and other experimental techniques. Prerequisite: Zoology 243 or equivalent, and permission of instructor. Half-course. *Nicklas*

243. *Cytology*. The structure of the cell. Prerequisite: one year of bi-

ology. (Combined course with Botany 243.) One course. *Anderson (Botany) and Nicklas*

244. *Topics in Cell Structure and Function*. Advanced discussion of selected problems such as chromosome structure, mitosis, and cytological aspects of inheritance and development. Prerequisite: Zoology 243 (Botany 243) or equivalent and permission of the instructor. Half course. *Nicklas and Moses (Anatomy)*

245. *Radiation Biology*. Actions of ionizing and excitational radiations on life processes: a survey and an adventure in biophysics. Prerequisites: college physics, mathematics, and organic chemistry. One course (optional laboratory). *Fluke*

246. *Physical Biology*. Physical principles of structure and function in large biological molecules and aggregates, applications to function at higher levels of organization, and to biological fitness. Prerequisites: Mathematics 22, Chemistry 151, Physics 41, and one and one-half years of college biology or consent of the instructors. One course (optional laboratory). *Fluke and Wainwright*

247. *Biological Nucleonics*. Fundamentals of nucleonics instruction in biological uses of radioactive tracers, in counting instruments and measurements, and in legal requirements. Prerequisites: consent of instructor and one year each of college biology, chemistry, and physics. One course. *Fluke*

248. *Introductory Biochemistry*. The chemistry of proteins, lipids, carbohydrates, nucleic acids, and their metabolic interrelationships. The biochemical basis of photosynthesis, genetics, vision, nutrition, nerve conduction, and muscle contraction. Prerequisites: Chemistry 151, one year of college physics (second semester may be concurrent), Mathematics 22, or consent of instructor. One course. *Biochemistry Staff*

250. *Physiological Ecology of Marine Animals*. A study of the physiological responses of marine animals in relation to certain environmental factors and evolution. Animals representing numerous phyla from various habitats are studied. (Given at Beaufort.) Prerequisite: a course in physiology. One and one-half courses. *Staff*

252. *Comparative Physiology*. The physiological mechanisms of animals studied on a comparative basis. Prerequisite: Zoology 151 or equivalent. One course. *Schmidt-Nielsen*

271. *Cellular Physiology*. The physiological processes of living matter approached through studies of cells. Prerequisites: two years of biology and at least one year of chemistry. One course. *Wilbur*

274. *Invertebrate Zoology*. Structure, functions, and habits of invertebrate animals under normal and experimental conditions. Field trip will be made to study, collect, and classify animals in their natural habitats. (Given at Beaufort.) One and one-half courses. *Staff*

278. *Invertebrate Embryology*. Lectures, readings, and laboratory work dealing with rearing, development, and life history of invertebrates. Prerequisite: Zoology 92. One course. *Bookhout*

280. *Principles of Genetics*. Structure and properties of genes and chromosomes, and evolution of genetic systems. Prerequisites: introductory courses in biology, chemistry, and mathematics, or equivalent. (Also listed as Botany 180, Botany 280 and Zoology 180.) One course. *Boyn-ton, Gillham, and others of the University Program in Genetics*.

288S. *Seminar in Cytology and Genetics*. Discussions of topics of current interest and controversy which naturally will vary from year to year. Students may take the course more than once. Prerequisites: a course in genetics or cytology, and permission of at least one of the instructors. Half-course. *Counce (Anatomy), Gillham, and Nicklas*

Genetics, The University Program. Genetics courses offered by the Department of Zoology are part of The University Program in Genetics; see announcement in this *Bulletin*.

Marine Laboratory. The following courses are given at Duke University Marine Laboratory, Beaufort, N.C.: 203, *Marine Ecology*; 214, *Biological Oceanography*; 240, *Chemical Oceanography*; 250, *Physiological Ecology of Marine Animals*; 274, *Marine Invertebrate Zoology*. Consult the *Bulletin of the Duke University Marine Laboratory*.

Departmental Major

Prerequisites: Biology 11-12 or Zoology 11-12 or consent of the Supervisor of Freshman Instruction.

Major Requirements. (The A.B. degree only is offered.) A minimum of five zoology courses not including the above prerequisites. In consultation with his advisor each student can design a program of study tailored to his own interest and plans for the future. Most zoology majors take courses in physiology, genetics, and some aspect of morphology. College-level training in mathematics and sciences other than zoology (usually calculus and organic chemistry) is essential to an understanding of modern biology but the amount and nature of this related work need not be the same for all students. The department offers work leading to Graduation with Distinction. See the section on Honors.

Departmental Handbook. Any student who is considering a zoology major should obtain a copy of this mimeographed handbook from the Zoology Department Office. It describes the advising system, typical courses of study, special programs, interests and background of the faculty, courses, available in neighboring institutions, and other topics.

School of Engineering

The courses offered in the School of Engineering are listed below. Each engineering department and division offers work leading to Graduation with Distinction. Consult the section on Honors.

Engineering Non-Departmental Undergraduate Courses

- Egr 11. *Introduction to Visual Communication*. Half-course. Lewis
Egr 15. *Introduction to Engineering Design*. Half-course. Linderoth
Egr 21. *Survey of Engineering*. Half-course. Kraybill
Egr 23. *Statics*. Corequisite: Mathematics 22. 3 s.h. Nash
Egr 31. *Computers in Engineering*. One course. Hill
Egr 63. *Introductory Electric Systems I*. Corequisites: Math 73 and Physics 51. 4 s.h. Meier, Trickey, and Wells
Egr 73. *Mechanics of Deformable Bodies*. Prerequisite: Egr 23. 3 s.h. Arges, Palmer, and J. Wilson
Egr 83. *Structure and Properties of Solids*. Prerequisite: Chem 2. Corequisites: Egr 73 and Math 73. 3 s.h. Pearsall and Shepard
Egr 101. *Thermodynamics*. Prerequisites: Chem 2 and Physics 52. 3 s.h. Elsevier, Harman, Kenyon, and Sheppard
Egr 113. *Introductory Electric Systems II*. 3 s.h. Owen, Pilkington, Shepard, and Wang
Egr 123. *Dynamics*. Prerequisites: Egr 23, Math 73, and Physics 51. 3 s.h. Clough, Nash, Palmer, and Wright
Egr 133. *Heat Transfer*. Prerequisite: Math 73. Corequisite: Egr 101. 2 s.h. Chaddock and Werner
Egr 143. *Fluid Mechanics*. Prerequisite: Math 73. Corequisite: Egr 123. 2 s.h. Buzzard, Kenyon, Muga, and Wilson
Egr 163. *Fields*. Prerequisite: Math 111. Corequisite: Egr 113, 123, 133, and 143. 3 s.h. George and Thurstone
†Egr 169. *Legal Aspects of Engineering*. Open to seniors only. 3 s.h. Olive
†Egr 170. *Patent Law for Engineers*. Open to seniors only. 3 s.h. Olive

Civil Engineering

Professor Vesić, *Chairman*; Professor Bryan, *Director of Undergraduate Studies*; Professor Brown; Associate Professors Hill, Muga, and Palmer; Assistant Professors Arges, Clough, Dvorak, and Wilson; Adjunct Associate Professor Kumar; Part-time Instructor Sheppard

- CE 12. *Statics*. Corequisite: Mathematics 32. Half-course. Arges

†Offered on sufficient demand; enrollment limited.

CE 16. *Surveying for Engineers*. Corequisite: Mathematics 31. Half-course. *Arges*

CE 96. *Geodetic and Location Measurements*. Prerequisite: Egr 2. 3 s.h. *Sheppard*

CE 116. *Transportation Engineering*. Concurrent: CE 96. 3 s.h.

CE 118. *Materials of Construction*. Prerequisites: Egr 73 and 83. 2 s.h. *Arges*

CE 123. *Hydraulic Engineering*. Prerequisite: Egr 143. 4 s.h. *Muga*

CE 124. *Sanitary Engineering*. Prerequisite: CE 123 or consent of instructor for non-civil-engineering students. 3 s.h. *Bryan*

†CE 126. *Sanitary Engineering Design*. Prerequisite: CE 124. 3 s.h.

Bryan

CE 131. *Structural Mechanics I*. Prerequisites: Egr 73 and Math 63. 3 s.h. *Brown*

CE 133. *Structural Design I*. Prerequisite: Egr 73. Concurrent: CE 131. 4 s.h. *Palmer*

CE 134. *Structural Design II*. Prerequisite: CE 131. 3 s.h. *Palmer*

CE 139. *Introduction to Soil Mechanics*. Prerequisite: Egr 83 and 143. 4 s.h. *Clough*

†CE 140. *Structural Mechanics II*. Prerequisite: CE 131. 3 s.h. *Brown*

CE 143, 144. *Projects in Civil Engineering*. Prerequisite: approval of Director of Undergraduate Studies and of instructor under whom work will be done. 1-6 s.h.

†CE 146. *Professional Engineering*. Prerequisite: senior standing. 2 s.h. *Palmer*

†CE 201. *Advanced Mechanics of Materials*. 3 s.h. *Dvorak*

†CE 202. *Experimental Mechanics*. 3 s.h.

†CE 203. *Elastic Stability*. Prerequisite: CE 201. 3 s.h. *Wilson*

†CE 204. *Plates and Shells*. Prerequisite: CE 201. 3 s.h. *Hill*

†CE 205. *Elasticity*. Prerequisite: CE 201. 3 s.h. *Dvorak*

†CE 211. *Mechanical Behavior of Materials*. Corequisite: CE 201. 3 s.h. *Kumar*

†CE 212. *Structural Materials*. Prerequisite: CE 211. 3 s.h. *Dvorak*
and Kumar

†CE 221. *Incompressible Fluid Flow*. 3 s.h. *Muga*

†CE 222. *Open Channel Flow*. 3 s.h. *Muga*

†CE 223. *Flow Through Porous Media*. 3 s.h. *Muga*

†CE 224. *Coastal and Tidal Hydraulics*. 3 s.h. *Muga*

†CE 225. *Engineering Hydrology*. 3 s.h. *Bryan*

†CE 231. *Structural Engineering*. 3 s.h. *Brown*

†CE 232. *Reinforced Concrete Design*. 3 s.h. *Brown*

†CE 233. *Prestressed Concrete Design*. 3 s.h. *Brown*

†CE 234. *Structural Design in Metals*. 3 s.h. *Palmer*

†Offered on sufficient demand; enrollment limited.

- †CE 235. *Foundation Engineering*. 3 s.h. Vesić
 †CE 236. *Earth Structures*. 3 s.h. Clough
 †CE 243, 244. *Sanitary Engineering Unit Operations and Process Design*. 6 s.h. Bryan
 †CE 250. *Engineering Analysis*. 3 s.h. Wilson

Electrical Engineering

Professor Owen, *Chairman*; Professor Meier, *Director of Undergraduate Studies*; Professors Artley, Kerr, Pilkington, and Wilson; Visiting Professor Trickey; Associate Professors Hacker, Joines, Kraybill, Marinos, Nolte, Thurstone, and Wells; Adjunct Associate Professors Burger, Olive, and Wortman; Assistant Professors George and Wang

EE 42. *An Introduction to Digital Systems*. One course. Marinos

EE 161. *Electronics and Signals*. Prerequisite: Egr 113. 3 s.h. Owen and Wilson

EE 162. *Electromechanical Energy Conversion*. Prerequisites: Egr 113, 123, 163. 2 s.h. Trickey and Wilson

EE 163. *Physical Electronics*. Prerequisites: Egr 163 and Physics 161
 Corequisite: EE 164. 3 s.h. Hacker and Joines

EE 164. *Electromagnetic Fields and Waves*. Prerequisite: Egr 163. 4 s.h. Joines and Kerr

EE 167. *Design Colloquium*. 2 s.h. Meier

†EE 173-174. *Projects in Electrical Engineering*. Open to seniors in the Graduation with Distinction Program, or to those with previous experience directly related to the proposed project. Approval of Director of Undergraduate Studies required. 1-6 s.h. Staff

EE 185. *Pulse and Digital Electronics*. 3 s.h. George

EE 186. *Modulation Systems and Noise*. Prerequisite: EE 161. 3 s.h. Nolte

EE 187. *Electronic Processes in Materials*. Prerequisite: EE 163. 3 s.h. Hacker

EE 188. *Dynamics of Electromechanical Energy Conversion*. Prerequisite: EE 162. 3 s.h. Trickey

†EE 195. *Nuclear Engineering Fundamentals*. Prerequisite: Physics 161. 3 s.h. Wortman

EE 196. *Microwaves and Quantum Electronics*. Prerequisite: EE 164. 3 s.h. Joines

†EE 199. *Linear Feedback Systems*. Prerequisite: permission of instructor. 3 s.h. Wells

EE 203. *Random Signals and Noise*. 3 s.h. Nolte and Owen

EE 204. *Information Theory and Communication Systems*. Prerequisite: EE 203. 3 s.h. Kerr and Nolte

†Offered on sufficient demand; enrollment limited.

- EE 205. *Signal Detection and Extraction Theory*. Prerequisite: EE 203 or permission of instructor. 3 s.h. Nolte
- EE 207. *Theory and Design of Switching Networks*. Prerequisite: permission of instructor. 3 s.h. Marinos
- EE 208. *Digital Computer Design*. Prerequisite: EE 207 or permission of instructor. 3 s.h. Marinos
- EE 211. *Solid State Theory*. Prerequisite: permission of instructor. 3 s.h. Artley and Hacker
- EE 212. *Solid State Materials*. Prerequisite: EE 211. 3 s.h. Artley and Hacker
- EE 213. *Principles of Magnetism*. Prerequisite: EE 211 or permission of instructor. 3 s.h. Artley and Hacker
- EE 215. *Semiconductor Physics*. Prerequisite: EE 211 or permission of instructor. 3 s.h. Hacker
- EE 217. *Masers*. Prerequisite: permission of instructor. 3 s.h. George
- EE 222. *Nonlinear Analysis*. Prerequisite: permission of instructor. 3 s.h. Wilson
- EE 225. *Semiconductor Electronic Circuits*. Prerequisite: permission of instructor. 3 s.h. Joines and Owen
- EE 227. *Network Synthesis*. Prerequisite: permission of instructor. 3 s.h. George and Marinos
- EE 241. *Linear Control Systems*. Prerequisite: permission of instructor. Credit not given for both EE 199 and EE 241. 3 s.h. Wells
- EE 243. *Advanced Linear Systems Theory*. Prerequisite: permission of instructor. 3 s.h. Wang

Mechanical Engineering

Professor Chaddock, *Chairman*; Professor Kenyon, *Director of Undergraduate Studies*; Professors Linderoth, Macduff, Meriam, and Pearsall; Associate Professors Clark, Elsevier, and Harman; Adjunct Associate Professor Murray; Assistant Professors Buzzard, Lewis, Nash, Shepard, Werner, and Wright; Mr. Warner

ME 31. *Engineering Applications of Digital Computation*. One course. Buzzard

- ME 102. *Thermodynamics II*. Prerequisite: Egr 101. 3 s.h. Elsevier
- †ME 111. *Physical Metallurgy*. Prerequisite: Egr 83. 3 s.h. Shepard
- †ME 112. *Polymer Science*. Prerequisite: Egr 83. 3 s.h. Pearsall
- †ME 122. *Transport Phenomena*. Prerequisite: Egr 133 and 143, Math 111. 3 s.h. Chaddock and Werner
- †ME 128. *Dynamics of Gases*. Prerequisite: ME 102. Concurrent: ME 106. 3 s.h. Werner
- ME 133. *Mechanical Design I*. Prerequisite: Math 73. Concurrent: Egr 123. 3 s.h. Nash

†Offered on sufficient demand; enrollment limited.

ME 134. *Mechanical Design II*. Prerequisite: ME 133. 2 s.h. *Linderoth*

ME 135. *Vibration Control*. Prerequisites: Math 73 and ME 133. 3 s.h. *Macduff*

ME 136. *Response of Systems*. Concurrent: Math 111. 3 s.h. *Macduff*

†ME 153. *Heating, Air Conditioning, and Refrigeration*. Prerequisite: ME 102. 3 s.h. *Elsevier*

†ME 156. *Combustion Engines*. Prerequisite: ME 102. 3 s.h. *Elsevier*

†ME 165-166. *Special Topics in Mechanical Engineering*. Prerequisite: permission of instructor and Director of Undergraduate Studies. 1-6 s.h. *Staff*

†ME 172. *Kinematics of Mechanisms*. Prerequisite: ME 133. 3 s.h. *Nash*

†ME 177. *Computer Techniques for Simulation and Design*. *Wright*

†ME 182. *Fundamentals of Nuclear Engineering*. Prerequisite: permission of instructor. 3 s.h. *Kenyon*

†ME 183. *Power Plants*. Prerequisite: ME 102. 3 s.h. *Kenyon*

ME 197-198. *Projects in Mechanical Engineering*. Open to seniors upon assignment by the Chairman of the department. Prerequisite: 3.0 average and senior standing. 1-6 s.h. *Staff*

†ME 202. *Theoretical Thermodynamics*. 3 s.h. *Harman*

†ME 203. *Introduction to Advanced Mechanics*. 3 s.h. *Macduff and Wright*

†ME 211. *Theoretical and Applied Polymer Science*. 3 s.h. *Pearsall*

†ME 221. *Compressible Fluid Flow*. 3 s.h. *Harman and Werner*

†ME 222. *Heat Transfer*. 3 s.h. *Chaddock and Werner*

†ME 226. *Intermediate Fluid Mechanics*. 3 s.h. *Buzzard*

†ME 231. *Systems Response and Control*. 3 s.h. *Macduff and Wright*

†ME 233. *Fluid Control Systems*. 3 s.h. *Macduff*

†ME 235. *Advanced Mechanical Vibrations*. 3 s.h. *Macduff*

†ME 251. *Refrigeration and Cryogenics*. 3 s.h. *Chaddock*

†ME 255. *Energy Conversion*. 3 s.h. *Elsevier and Harman*

†ME 265. *Advanced Topics in Mechanical Engineering*. Prerequisite: approval of the Director of Graduate Studies and of the instructor under whom work will be done. 1-3 s.h. *Members of the Graduate Staff*

†ME 270. *Theory of Lubrication and Bearing Design*. 3 s.h. *Linderoth*

†ME 280. *Nuclear Reactor Power Cycles*. 3 s.h. *Kenyon*

Biomedical Engineering

Professor Pilkington, *Chairman*; Associate Professors Clark, Hills and Thurstone; Assistant Professors Barr, Hammond, and Wachtel

†Offered on sufficient demand; enrollment limited.

- BME 191-192. *Projects in Biomedical Engineering*. 1-6 s.h. Staff
BME 201. *Introductory Biomedical Engineering* 4 s.h. Wachtel and
Pilkington
BME 202. *Introductory Biomedical Engineering II*. Prerequisite: BME
201. 4 s.h. Thurstone, Clark, and Hills
BME 265. *Advanced Topics in Biomedical Engineering*. 1-4 s.h. Staff



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BULLETIN OF DUKE UNIVERSITY

School of Nursing
1970



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BULLETIN OF DUKE UNIVERSITY

School of Nursing
1970-1971

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Calendar of the School of Nursing

Academic Year 1970-1971

September

- 14 Monday—Senior clinical courses are scheduled
- 15 Tuesday 7:30 p.m.—Orientation begins for all entering freshmen and new students with advanced standing
- 17 Thursday—Registration and matriculation of students who have not preregistered
- 19 Saturday—Final registration of preregistered students
- 21 Monday—Fall semester classes begin

November

- 25 Wednesday 12:30—Thanksgiving recess begins
- 30 Monday 8:10 a.m.—Classes resumed

December

- 11 Friday—Founders' Day
- 19 Saturday, 12:30 p.m.—Christmas recess begins

1971

January

- 4 Monday, 8:10 a.m.—Classes are resumed
- 16 Saturday, 12:30 p.m.—Fall semester classes end
- 21 Thursday—Final examinations begin
- 30 Saturday—Final examinations end

February

- 4 Thursday—Registration and matriculation of new students
- 6 Saturday—Last day for matriculation for spring semester
- 8 Monday—Spring semester classes begin

March

- 20 Saturday—Last day for reporting six-weeks grades
- 27 Saturday, 12:30 p.m.—Spring recess begins

April

- 5 Monday, 8:10 a.m.—Classes are resumed
- 4/30 & 5/1 Friday-Saturday Spring Weekend—Classes are not held.

May

- 20 Thursday, 5:00 p.m.—Spring semester classes end
- 24 Monday—Final examination begin

June

- 2 Wednesday—Final examinations end
- 5 Saturday—Commencement begins
- 6 Sunday—Commencement Sermon
- 7 Monday—Graduation Exercises

Officers of the School of Nursing

General Administration

Terry Sanford, LL.B., *President*

Barnes Woodhall, M.D., *Chancellor pro tem*

Marcus E. Hobbs, Ph.D., *Provost*

Charles B. Huestis, *Vice President for Business and Finance*

William G. Anlyan, M.D., *Vice President for Health Affairs*

Frank Leon Ashmore, A.B., *Vice President for Institutional Advancement*

Gerhard Chester Henriksen, M.A., C.P.A., *Vice President and Treasurer*

Everett Harold Hopkins, M.A., LL.D., *Vice President for Regional Programs*

Harold W. Lewis, Ph.D., *Vice Provost and Dean of Faculty*

John C. McKinney, Ph.D., *Vice Provost and Dean of the Graduate School*

James L. Price, Jr., Ph.D., *Vice Provost and Dean of Undergraduate Education*

Craufurd David Goodwin, Ph.D., *Vice Provost and Director of International Programs*

Benjamin Edward Powell, Ph.D., *Librarian*

Clark R. Cahow, Ph.D., *University Registrar*

Rufus H. Powell, LL.B., *Secretary of University*

Stephen Cannada Harward, A.B., C.P.A., *Assistant Secretary and Controller*

Edwin Constant Bryson, LL.B., *University Counsel*

School of Nursing Administration

Ann Jacobansky, R.N., M.Ed., *Dean of the School of Nursing*

Virginia Stone, R.N., Ph.D., *Director of Graduate Studies*

Kathryn Crossland, R.N., Ed.D., *Director of Undergraduate Studies*

Ella E. Shore, A.B., M.R.E., M.A., *Dean of Student Affairs*

Raymond Ingraham, *Administrative Assistant to the Dean*

Mary Horres, B.A., M.S.L.S., *Librarian, School of Nursing*

School of Nursing Committees

Executive Committee of School of Nursing

Dean A. Jacobansky, *Chairman*, Virginia Stone, Ella E. Shore, Ruth Bowers, Kathryn Crossland, Theresa Horton, Ray Ingraham

Committee on Undergraduate Studies

K. Crossland, *Chairman*, G. Fortune, P. Gratz, T. Horton, S. Norville, V. Stone

Committee on Graduate Studies

Virginia Stone, *Chairman*, K. Crossland, C. Helvie, A. Jacobansky, M. Shaughnessy

Duke Medical Center Nursing Service Administration

Verna K. Sticht, R.N., B.S., *Acting Director of Nursing Service*

Geraldine Bodie, R.N., M.S.N., *Assistant Director, Medical Nursing Service*

Diane Burke, R.N., B.S., *Assistant Director, Pediatric Nursing Service*

Edith Aiken, R.N., *Supervisor, Medical Specialties*

Nancy Burris, R.N., *Surgical Clinical Evening Supervisor*

Mable Easter, R.N., *Medical-Surgical Clinical Night Supervisor*

Gertrude Fields, R.N., *Supervisor, Ob-Gyn Nursing Service*

Betty Freeman, R.N., *Supervisor, Psychiatric Nursing Service*

Doris Haase, R.N., *Acting Supervisor, Surgical Specialties*

Marjorie Hemphill, R.N., *Evening Supervisor*

Jane Howell, R.N., B.S., *Supervisor, Emergency Room*

Sarah Jeffreys, R.N., *Supervisor, Surgical Nursing*

Mary McColm, R.N., M.S.P.H., *Director, Outpatient Nursing Service*

Velma Rohla, R.N., *Night Supervisor*

Julia Taylor, R.N., *Supervisor, Surgical Specialties*

Elsie Vaughn, R.N., *Night Supervisor*

North Carolina Cerebral Palsy Hospital

Christine Vick, *Administrator*

Ava T. Albritten, R.N., *Director Nursing Service*

Lenox Baker, M.D., *Medical Director*

Durham Veterans Administration

William B. Sheppard, B.S., M.H.A., *Administrator*

Margaret I. Williams, R.N., M.S., *Assistant Chief, Nursing Service*

Margaret S. Rosser, R.N., M.S., *Associate Chief, Nursing Service for Education*

School of Nursing Faculty

April, 1970

Helen Bigler, R.N., DSNc., *Assistant Professor of Nursing*
Ruth Bowers, R.N., M.A., *Associate Professor of Nursing*
Frances Blackwell, R.N., M.S.N., *Instructor of Nursing*
Elizabeth Bregg, R.N., M.P.H., *Associate Professor of Nursing*
*Myrtle Irene Brown, R.N., Ph.D., *Professor of Nursing*
Dorothy Brundage, R.N., M.S.N., *Instructor of Nursing*
Grace Bullock, R.N., M.S.N., *Assistant Professor of Nursing*
Janet Campbell, R.N., Ph.D., *Associate Professor of Nursing*
Linda Charnes, R.N., M.S.N., *Instructor of Nursing*
Joyce Crane, R.N., M.S.N., *Associate Professor of Nursing*
Kathryn Crossland, R.N., Ed.D., *Professor of Nursing*
Ollie Davenport, R.N., M.S.N., *Assistant Professor of Nursing*
Catherine Dennis, R.N., M.S., *Instructor of Nursing*
Mary Denyes, R.N., M.S.N., *Assistant Professor of Nursing*
Gretchen Dery, R.N., M.S.N., *Instructor of Nursing*
*Lydia DeSantis, R.N., M.S.N., *Instructor of Nursing*
Robertta Feather, R.N., M.S.N., *Assistant Professor of Nursing*
Gwendolyn Fortune, R.N., M.S.N., *Associate Professor of Nursing*
Barbara Germino, R.N., M.S.N., *Assistant Professor of Nursing*
Pauline Gratz, Ed.D., *Professor of Human Ecology in Nursing*
Carl Helvie, R.N., Dr. P.H., *Associate Professor of Nursing*
*Julia Hester, R.N., M.S.N., *Assistant Professor of Nursing*
Carol Hogue, R.N., M.S.N., *Assistant Professor of Nursing*
Theresa Horton, R.N., M.N.Ed., *Assistant Professor of Nursing*
Ann Jacobansky, R.N., M.Ed., *Professor of Nursing*
Patricia Lawrence, R.N., M.A., *Assistant Professor of Nursing*
Margaret Lawson, R.N., M.N., *Instructor of Nursing*
Wilma Minniear, R.N., M.S.N., *Associate Professor of Nursing*

*Leave of absence.

*Nancy Nolan, R.N., M.S.N., *Assistant Professor of Nursing*
Annie Sue Norville, R.N., M.S.N., *Assistant Professor of Nursing*
Joann Ritchie, R.N., M.S.N., *Assistant Professor of Nursing*
Mary Shaughnessy, R.N., M.S., *Associate Professor of Nursing*
Sandra Smith, R.N., M.S.N., *Instructor of Nursing*
Virginia Stone, R.N., Ph.D., *Professor of Nursing*
Geraldine Talarczyk, R.N., M.S.N., *Instructor of Nursing*
Helen Young, R.N., M.S., *Assistant Professor of Nursing*
Willamay Whitner, Ed.D., *Associate Professor of Nursing*

Instructional Assistants

Karen Ehrnman
Kay Hesse
Martha Urbaniak

Part-Time Instructional Staff

Cecil Slome, M.D., *Lecturer*
John B. Reckless, M.D., *Associate Professor*

Student Affairs

Ella E. Shore, A.B., M.R.E., M.A., *Dean of Student Affairs*
Dorothy Wilkinson, R.N., *House Counselor*
Mildred Coulbourn, B.A., M.A.
Jean R. Ball, A.B., M.A.T.

Student Health

Mary Jane Nye, M.D., *Student Health Physician*
Helen Howard, R.N., *Health Office Nurse*

*Leave of absence.

General Information

Philosophy of the School of Nursing

The School of Nursing functions within the philosophy of Duke University. This philosophy is epitomized by its motto, *Eruditio et Religio*, which "reflects a fundamental faith in the union of knowledge and religion, the advancement of learning, the defense of scholarship, the love of freedom and truth, a spirit of tolerance, and a rendering of the greatest service to the individual, the state, the nation, and the church. Through changing generations of students, the objective has been to encourage each individual to achieve to the extent of his capacities an understanding and appreciation of the world in which he lives, his relationship to it, his opportunities, and his responsibilities."

The faculty of the School of Nursing ascribes to the concept that a professional nurse is a person who has acquired the specialized knowledge of nursing, who has attained abilities useful in the practice of nursing, and who has developed attitudes appropriate to the profession of nursing.

The faculty conceives professional nursing to be a service which contributes to the health and well being of people. Professional nursing practice is dealing with human beings under stress, frequently over long periods of time; providing comfort and support in times of pain, anxiety, loneliness, and helplessness; perceiving, evaluating, and intervening appropriately; administering medications and treatments; using clinical nursing judgment in establishing, maintaining, and/or modifying a plan of

care; and knowing when and how to use existing and potential resources to help patients toward recovery and adjustment. Professional nursing practice is sharing responsibility for the health and welfare of all those in the community; participating in programs designed to prevent illness and maintain health; coordinating professional and technical services in the best interest of patient care; and supervising, teaching, and directing all those who give nursing care. Professional nursing practice requires constant evaluation; asks questions and seeks answers which will add to the body of nursing theories; and transmits and uses the theories, as well as other research findings, to improve services to patients and service programs to people. Professional nursing practice requires knowledge and skill of high order and provides opportunities for personal and professional fulfillment.

The faculty believes that the primary aim of nursing education is to provide an environment in which the student can develop self-discipline, intellectual curiosity, the ability to think critically, and acquire the knowledge necessary for practice. The faculty believes that learning is manifested by change of behavior, resulting from experience; that an atmosphere for learning is one in which systematic direction and guidance of the learner is offered in a climate which encourages self-direction and creativity; that professional nurse education implies that the student who seeks admission to the School comes with the intent of practicing professional nursing; and that the curriculum offered aids the student in realizing this intent and in stimulating the desire for continued professional growth.

The School of Nursing is committed to promoting human health and welfare through providing foundations for knowledgeable nursing services and is committed to contributing to the attainment of the University's aims of teaching, research, and public service.

The School aims to prepare its graduates to function as practitioners of professional nursing in roles most appropriate to the level of their preparation. The School aims to provide its students with an educational background which will serve as a basis for advanced study in nursing, and for continued personal and professional growth.

History

The School of Nursing of Duke University was established in association with the School of Medicine and Duke Hospital. The first class of students was admitted in January, 1931. In 1953, the School of Nursing was incorporated into the Division of Health Affairs in the University structure. When established, the three-year curriculum leading to the Diploma in Nursing was planned to prepare young women to meet com-

munity nursing needs; students who completed two years of acceptable college work were awarded a Bachelor of Science degree in Nursing in addition to the Diploma in Nursing. Trends in nursing created a demand for a four-year program leading to the degree of Bachelor of Science in Nursing, and in 1953, the University Board of Trustees approved such a program. The Master of Science in Nursing degree was authorized in 1956.

Graduates of Duke University School of Nursing have served their communities in North Carolina and in other states; they have participated in their professional organizations on a national, state, and local level. During World War II, graduates of this School staffed the 65th General Hospital of the Duke University Medical Unit.

Relationship to the University

As a part of the University community, the School of Nursing serves its students as the focus of a total educational experience that only a major university can provide. It shares the same campus with Trinity College, the School of Engineering, the Graduate School, the Divinity School, and the Schools of Law, Medicine, and Forestry, and Duke Medical Center. The facilities for library, laboratory, and field work, and the many activities—religious, intellectual, cultural, and athletic—form part of the environment which contributes to the development of students in nursing. Thus, the student in nursing may enjoy simultaneously the broad facilities and challenges of a University and the life and atmosphere of a professional school.

Membership and Accreditation

Duke University, which incorporates the School of Nursing with all of the other schools of the University, is a member of the Association of American Colleges and is accredited by the Southern Association of Colleges and Secondary Schools.

The generic program leading to the degree of Bachelor of Science in Nursing and the program leading to the degree of Master of Science in Nursing are accredited by the National League for Nursing and the North Carolina Board of Nursing.

The School is a member of the Department of Baccalaureate and Higher Degree Programs of the National League for Nursing.

Undergraduate Course of Study and Requirements for Degree

Bachelor of Science in Nursing

The School of Nursing, through its Division of Undergraduate Studies, offers a program which can be completed in four academic years, leading to the Bachelor of Science in Nursing degree. The graduate is eligible to apply for examination for licensure as a registered nurse in any state.

The general purpose of the program is to offer educational opportunities which will enable the student's maximal growth toward his personal and professional goals. The program of studies unifies general and special education to the end that the graduate may effectively assume his responsibilities as a person, a citizen, and a professional practitioner.

The broad approach to nursing in various settings focuses on nursing care that is individualized and adapted to the unique personality and circumstances of the patient and his health state and potential. Thus the graduate is expected to find satisfaction in functioning as a beginning practitioner in institutions and agencies, or as a private practitioner.

The student, with the guidance of his academic adviser, may elect courses and experiences which best serve his interests for concentration in a special area of study or for exploration in several fields. Inherent in

this approach is the foundation for continuing growth and for advanced study in accordance with the student's goals.

Program of Study

The baccalaureate program is designed to produce a professional nurse who has (1) comprehension and appreciation of man and his relationships, opportunities, and responsibilities in his dynamic environment; (2) the knowledge, comprehension, and skill essential to the process of nursing, (3) the knowledge and comprehension of a professional role within a social, biological, and cultural framework, and (4) a foundation for potential social sensitivity and the desire for continuous self-education and fulfillment. Studies in the freshman and sophomore years are devoted primarily to the liberal arts and basic sciences; during these years, co-curricular activities are provided to introduce the student to nursing. The focus of the junior and senior years is the nursing major. Transfer students will be considered on an individual basis.

Course Requirements ^{1,2,3}

For graduation a student must have passed at least 32 semester-courses (or a combination of semester-courses, half-courses, and double-courses that would be equivalent to 32 semester-courses), including the approved curriculum. A student must have passed a minimum of 14 semester-courses before entering the upper division professional curriculum. The normal academic load is four courses per semester.

Lower Division

The following standard course requirements are included as lower division (freshman and sophomore years) course work:

Natural Science	2 courses
Humanities	1 course
Social Science (Sociology or Anthropology and Psychology)	3 courses
Human Ecology (N 97, 98)	2 courses
Basic Statistics	1 course
Physical Education ⁴	.....
	9 courses

1. The curriculum for students who entered prior to September, 1968, is outlined in earlier *Bulletins*.

2. The nursing curriculum is under development and is, therefore, subject to change. Students should accept admission with this understanding.

3. Students admitted in 1970 are required either to demonstrate their ability to write good English, by meeting the standard accepted by the Undergraduate Faculty Council, or to pass one semester-course in English composition, which they should take in their first semester.

4. This requirement may be met by satisfactory completion of two years in ap-

The remaining elective courses (approximately seven semester-courses) of the lower division are selected by the student, with assistance and approval from his academic adviser, in accordance with his goals and interests. No more than four courses in the military sciences may be counted toward a student's graduation.

Students entering in the fall, 1970 and 1971 are required to have the following varieties of learning experiences, to be fulfilled at some time during the freshman and/or sophomore year: (a) a seminar in one semester, or (b) two preceptorials, discussion sections, or tutorials.

Students entering in 1972 are required to have:

A. Freshman year.

1. A seminar in one semester, or
2. Two preceptorials, discussion sections, or tutorials.

B. Sophomore year.

The same requirements as in the freshman year.

Upper Division^{1,2}

The junior and senior years are devoted to the professional curriculum.

Plan for the Junior Year

The following courses are required for students in the junior year:

Semester I

	<i>Courses</i>
N 101 Introduction to Theoretical Framework for Nursing	2
N 103 Introduction to Nursing Process	2

Semester II

	<i>Courses</i>
N 102 Theoretical Framework for Nursing	1
N 104 Nursing Process	2
Elective Nursing or Non-Nursing	1

During the junior and senior year, in addition to certain core courses, there are opportunities for nursing and non-nursing electives and independent study.

appropriate physical education courses or by an alternate form of physical activity approved by the Physical Education Department. The student must fulfill this requirement before entering the professional curriculum (upper division). The student receives letter grades for physical education courses but these grades do not count toward continuation, graduation, or honors, nor do physical activities count among the courses needed for graduation.

1. A more detailed description of N-101, N-102, N-103 and N-104 can be found under the section Undergraduate Courses of Instruction.

2. In the upper division students will be utilizing a variety of learning facilities. It will be the students responsibility to arrange her own transportation. Public transportation is available within the Durham city limits.

Clinical experience, which begins early in the junior year, provides essential opportunities for the student to practice skills, internalize knowledge and the nursing process, and develop behavior characteristic of the professional nurse.

Under the appropriate faculty guidance, each student may choose areas of interest to pursue for credit. The basic core described above prepares all graduates to function as beginning professionals in providing nursing service for patients, their families, and for communities, as well as in team leadership. Elective courses provide the student with additional content and experience in an area of interest and give him the opportunity to gain the increased proficiency for any type of initial professional position he might assume after graduation. The student may choose specialized clinical, teaching, or administrative experiences; or he may pursue research or a community agency interest such as school nursing, mental health clinical nursing, ambulatory care, emergency room care, or one of many other special experiences available to meet his particular learning needs.

The student is seen as an active participant in making decisions about his learning needs and interests. Teaching techniques take into consideration the spontaneity, potentiality, and individuality of the student. These techniques, when used in a cooperative environment, promote the student's fullest development.



Resources for Study

Instructional Facilities

The facilities for instruction include the resources available in the undergraduate, professional, and graduate schools and colleges of Duke University and the clinical facilities of Duke Hospital, the North Carolina Cerebral Palsy Hospital, the Veteran's Administration Hospital, the Durham Health Department, and the John Umstead Hospital.

In a wing of Hanes House are located the administrative offices of the School of Nursing, a large classroom seating 100 persons and equipped with audiovisual aids, a small classroom seating 50 persons and equipped with a screen and movie projector, a nursing laboratory with equipment for nursing practice for students, and conference rooms.

Duke Hospital

Duke Hospital, an integral part of the Medical Center, is a 728-bed 30-bassinet general hospital which performs the concurrent functions of patient care and professional education. It admits over 20,000 patients a year, and maintains comprehensive diagnostic and treatment facilities for their care.

Different levels of patient care are provided by a minimal care unit

and intensive care facilities in addition to conventional nursing units. Private, semi-private, and ward accommodations are available. Approximate daily patient census by service is as follows: surgery (including urology, otolaryngology, ophthalmology, and orthopaedics), 332; medicine (including dermatology and neurology), 231; pediatrics, 78; psychiatry, 52; and obstetrics-gynecology, 45. Surgical facilities include eighteen operating rooms and a recovery room; over 15,000 surgical procedures are performed annually. Two obstetrical delivery rooms are maintained.

Outpatient services include a public clinic which totals some 122,000 visits a year, a private diagnostic clinic of comparable size, and an active emergency service. All of the hospital components are located within a single building. Close working relationships between Duke Hospital and outside health agencies contribute to continued care.

Duke Hospital is approved for internship and residency training by the Council on Medical Education and Hospitals of the American Medical Association, and conducts an active educational program involving some 280 house staff members. The hospital is fully accredited by the Joint Commission on Accreditation of Hospitals.

Libraries

Nursing Library

A reference library of 7,000 books and periodicals is located in Hanes House for the use of students majoring in nursing. There are available approximately one hundred current periodicals on nursing and allied fields, as well as *The Cumulative Index to Nursing Literature*, *Index Medicus*, *International Nursing Index*, and *Hospital Literature*.

The library is open 98 hours a week with reference assistance available. Students may freely use other libraries on campus, both general and professional.

University Library

The new Perkins library, among the first seventeen university libraries in the country, contains 1,940,146 volumes and 4,000,000 manuscripts. About 80,000 volumes are added annually. Separate departmental and professional school libraries provide notable collections in the several disciplines.

More detailed information may be obtained in a *Student's Guide to the General Library*, available upon request to the Librarian of the University.

Medical School Library

The Medical Center Library, located in the Davison Building, attempts to provide all services and collections necessary to further educational, research, and clinical activities in the medical field. Extensive reference and bibliographical service is provided. The collection contains over 80,000 volumes and about 1,600 current periodicals.

The Trent Collection in the history of medicine is an unusually fine one, rich in manuscripts and rare books, and provides the opportunity for study and research as well as casual reading in the field.



Undergraduate Student Life

Living Accommodations

Housing

School of Nursing students presently live in Hanes House and Hanes Annex which have double and a few single rooms. Entering students may state room type preference; however, since returning students have first choice of rooms, no guarantee is made concerning room assignments. After the initial assignment, students themselves make arrangements for room selection and roommates through the Office of the Dean of Student Affairs in the School of Nursing.

Resident house counselors, who are on the staff of the Dean of Student Affairs in the School of Nursing, live in the dormitories and are responsible, with the cooperation of the student government, for their administration.

Dormitory accommodations are provided during Thanksgiving and spring vacations and part of the Christmas holidays, but all houses are closed during the summer sessions. Nursing students are housed on West Campus for the summer.

Rental Procedures

A \$25.00 room deposit is required before a student may reserve a room. Once she matriculates, the deposit is held for the entire period of her

academic enrollment. The deposit is refundable under the conditions described in the section Undergraduate Program: Financial Information.

Rooms are normally rented for the academic year; however, rental payments may be made by the semester. All payments must be made in advance of registration to the Bursar. After the day of registration, room rent will not be refunded.

Occupancy

Students are notified in August when they may occupy their rooms in September. Each student must be vacated from her room within 24 hours of her last obligation, i.e., examinations or 24 hours after commencement for graduating seniors.

Living Off-Campus

Normally, all undergraduate students, with the exception of those who are married or whose home is in Durham, live in University residence halls. However, overcrowded conditions have made it necessary to permit a limited number of senior women students who are twenty-one years of age and have authorization from the Dean of Student Affairs to live off-campus.

Storage

Limited storage facilities are available during the summer to students who have preregistered for the fall semester. Non-students or students living off-campus cannot store their personal effects in the residence halls.

Personal Property Insurance

The University assumes no financial responsibility for damages to or loss of personal property. Personal property insurance coverage is recommended for all students.

Food Services

A student *must pay board* during her first four regular school sessions. The dining facilities available to these students on board include the Graduate Center Cafeteria, any dining hall on East Campus, and the Blue and White and University Rooms on West Campus. Junior and senior students will not be required to pay board; however, they have the option of taking their meals on a board basis which would effect a considerable savings and give them the flexibility of eating in the Graduate Center, the East Campus dining halls, and the West Campus dining halls.

Student Health Service

Students enrolled in the regular program of studies are eligible for the services offered under the health program of the School. (The cost is included in the general fee each semester.)

Exceptions. The health program does not cover chronic or pre-existing conditions, private duty nursing, refraction of eyes, treatment of teeth, elective surgery, braces or any orthopaedic appliance, accidents or illness occurring during vacation or while off-campus. Blood used for transfusions must be paid for or replaced.

Physical Examinations. Physical examinations are provided for all nursing students in the spring of every year. Each student must have a physical examination in the spring prior to beginning her clinical experience and subsequently every spring.

Health Office. The health office in Hanes House, under the direction of a physician, is maintained for the students in the school. Advice, treatment, and examination are available to students during regularly scheduled hours. Consultations with Duke Medical Center staff specialists are arranged through the health office as necessary; arrangements for drugs, dressings, laboratory tests, and X-rays are made as needed.

Hospitalization. A student requiring hospitalization is admitted to Duke Hospital. Admission is arranged through the health office. Medical and surgical care is under the supervision of a senior physician or surgeon. Hospital care includes staff nursing, drugs, dressings, laboratory tests, and X-rays as needed. Hospital care is limited to thirty days. Non-board paying students are charged board while in hospital or infirmary (juniors, seniors).

If the student is covered by an insurance plan which provides for hospitalization, medical or surgical benefits, the coverage should be applied to the cost of care.

Student Health Insurance. A special commercial policy available only to regularly enrolled Duke students can be secured to furnish complementary protection, if desired. The insurance excludes any coverage for accident or illness cared for under the health program; insurance protection is furnished for off the campus and during vacations.

Student Mental Health Clinic. Staffed by members of the Duke Medical Center's Department of Psychiatry, the Student Mental Health Clinic provides psychiatric consultation without charge to all undergraduate women registered full time in the School of Nursing and The Woman's College. While special arrangements are made for extensive or prolonged therapy, this service is not included in the health program.

University Counseling Center

The University maintains a Counseling Center which provides a centralized program of educational, vocational, and personal counseling for

students. In addition, the center administers special group testing programs for University schools and departments and serves as the local testing center for a wide variety of national testing programs. The center also carries on programs of research in the field of measurement and counseling.

Office of Placement Services

The Office of Placement Services serves as a liaison between the students and potential employers by making available information about summer and permanent job opportunities and by offering students the opportunity to assemble, as a permanent file, complete dossiers of academic records and recommendations to supplement job applications. All services are offered without charge to Duke students and alumni.

Student Activities

Religious Life

"*Eruditio et Religio*," the motto emblazoned on the seal of the University, proclaims belief in the essential union of knowledge and religion in the educational process. The Gothic Chapel stands at the center of the campus, an inspiring symbol of the place of religion in the well-balanced life. The Chapel program encourages the cultivation of the moral and spiritual life of students.

Opportunities are provided through the Chapel and its related activities to translate worship into effective Christian living. Denominational, interdenominational, and interfaith loyalties are emphasized. Protestant, Roman Catholic, and Jewish students are organized in their respective groups, each having a denominational chaplain or adviser. The University Religious Council and the University Christian Movement promote the ecumenical religious life in its many facets.

Additional opportunities for the enrichment of the student's religious life are offered in organ and carillon recitals, in choral concerts, and in other special services. Some students, at their own discretion, participate actively in the program of the downtown churches of their choice.

Student Organizations

Student organizations provide for participation in many broad interest areas such as student government, student union, music, drama, service, publications, honorary and professional groups, and social activities.

Student Government. Every undergraduate student at Duke University is a member of the Associated Students of Duke University (ASDU),

the unitary student government organization formed in 1967. While the president, secretary, and treasurer are elected from the entire student membership, each of the undergraduate schools, including the School of Nursing, is represented on the executive and legislative branches of ASDU. ASDU concerns itself with issues which are of paramount concern to the entire University such as academic reform, student rights, and student services.

The Student Government Association of the Duke University School of Nursing is composed of all students in the undergraduate baccalaureate program, and is coordinated by elected students serving on the Executive Council. Each student has a voice in the consideration of social and academic matters and, through membership and holding offices, has the opportunity to serve her fellow students and the University. Because of the high regard for individual opinion and the democratic nature of decision-making, the student government fosters a sense of individuality, increases skills in group work, and promotes responsibility in developing and carrying out the policies of the School of Nursing and the University.

Duke University Union. Through its governing board and various program committees, the Duke University Union serves the entire university community by providing a broad program of cultural, educational, social, recreational, and spiritual activities.

Musical and Drama Groups. There are a variety of musical organizations made up of students throughout the University. They include the Chapel Choir, Women's Glee Club and Chorus, Chancel Singers, Symphony Orchestra, Concert Band, and Marching Band. The drama groups include the Duke Players and the Wesley Players, both of which present a number of plays and readings each year. Music and drama are combined in Hoof 'n' Horn, an organization which annually produces a musical comedy which is cast, directed, and acted by students from the entire University.

Publications. The students of Duke University publish a newspaper, a yearbook, and several magazines. Within the School of Nursing, the Publications Committee of the Student Government Association is responsible for *The Charge*, a handbook; *Beaux and Bows*, an orientation book for freshmen; and *Nurses Notes*, a monthly newspaper.

Santa Filomena. Santa Filomena is a senior honorary society founded for the purpose of recognizing achievement and promoting leadership among students in the School of Nursing. New members are selected from the junior class on the basis of scholarship, superior nursing ability, and service to the School of Nursing.

The North Carolina State Student Nurses Association. As members of the Duke University School of Nursing, students are members of the National Student Nurses' Association through membership in the North Carolina State Student Nurses' Association. Such membership facilitates social relationships and an interchange of ideas with students of various

programs of nursing education throughout the state and nation. Participation in the program of the district, state, and national association provides students with the opportunity to work with and learn more about their colleagues of the future.

Sororities. Eleven national sororities and one local sorority have chapters on the University campus. Although there are no chapter houses, the programs of the sororities are carried on within sections of various buildings on East Campus. Undergraduate women from The Woman's College and the School of Nursing have the opportunity to participate in sororities if they elect to do so.

Prizes and Awards

Duke University School of Nursing Alumnae Award

The Duke University School of Nursing Alumnae Award is presented to the student in the graduating class who has demonstrated outstanding leadership, scholarship, and nursing skill.

The Moseley Award

The Moseley Award of \$25.00 is given to the student in the senior class who has shown the most skill in the art of nursing throughout her program in the School of Nursing.

Mary M. Roberts Writing Awards

The Mary M. Roberts Writing Awards is a national writing competition for professional nurses and senior nursing students. Winners attend the Bread Loaf Writers' Conference in August at Middlebury College, Middlebury, Vermont. Details regarding rules and application procedure can be obtained through the office of the Dean.



Undergraduate Admission

New students are admitted for the academic year at the opening of school in the fall.

Candidates may qualify for admission as members of the freshman class or as students with advanced standing. Since the enrollment is limited, the Committee on Admissions selects students who, in its judgment, are best qualified to benefit from the educational advantages which the school offers. Selection is based not only upon academic grades and test scores but also upon recommendations of school officials and other personal criteria. A visit to the campus for a personal interview with a member of the Admissions Committee is suggested, but not required.

Requirements for Admission

Although there are no inflexible subject matter requirements, at least fifteen acceptable units of secondary school credit must be presented. Of these at least twelve must be in college preparatory subjects: English, foreign language, history and social studies, mathematics, and physical or biological sciences. It is strongly suggested that a student present at least one unit in either chemistry or physics.

Students applying for admission are required to take the Scholastic Aptitude Test, the English Composition Test, and two other achievement tests of their own choosing given by the College Entrance Examination

Board. These tests must be taken no later than the January test date of the College Board in a student's final year in high school.

Prospective students are urged to broaden their reading outside of class during their senior year and to read books and magazines that do not form a part of the subject matter of their courses. At the same time they should take every opportunity to increase their competence in writing. Those who cannot write simple, clear, grammatical English prose will be progressively at a serious disadvantage in the competition for admission and also in the general work of the freshman year. Careful attention to correctness in English in correspondence and on application blanks cannot be stressed too seriously for candidates for admission.

Evidence of a good health record will be requested after the applicant is considered for acceptance. Final acceptance will be contingent on a complete physical examination during the week of Orientation.

Early Decision Plan

For the well-qualified student who has definitely decided to enter Duke if accepted, the University offers to reserve a place by "early decision" on December 1 of the student's senior year in secondary school. The deadline date for completing applications for December decision is November 1. Prospective early decision candidates should make arrangements to take the Scholastic Aptitude Test and three Achievement tests, including English Composition, on or before the July testing date preceding their senior year.

Regular Admission

Candidates for regular admission must apply no later than February 1, and normally do so during the fall of the senior year. For this group, decisions are mailed no later than April 15.

Application forms and instructions regarding procedure and necessary documents to be included will be sent upon request by the Office of Undergraduate Admissions and Financial Aid, Duke University, Durham, North Carolina 27706. A non-refundable processing fee of \$15.00 must accompany the submission of the full application form.

Admission to Advanced Standing

Admission by transfer from other institutions may be arranged for a limited number of students, under certain well-defined regulations. All such candidates must submit official transcripts of all work completed at other colleges, accompanied by a statement of honorable dismissal and scores on the Scholastic Aptitude Test of the College Entrance Examination Board. Transfer credit is usually granted for courses comparable to those offered by Duke University in which the student has earned a

grade of C or better. Students may not apply for transfer beyond admission to the sophomore class. Further detailed regulations for admission by transfer may be obtained from the Office of Undergraduate Admissions.

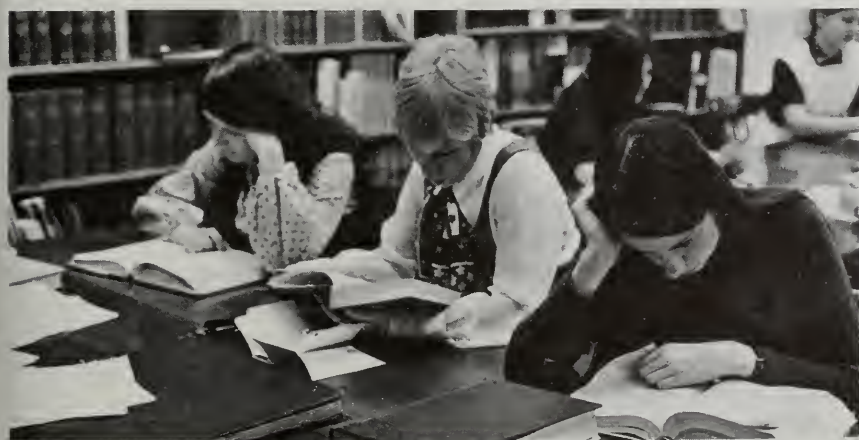
Applicants for advanced standing in the School of Nursing should present, as far as possible, subjects corresponding to those required by the School. They may not, during their first semester, register for more than the minimum number of courses required of the class which they enter, except by permission of the Dean of the School of Nursing.

Students in the School of Nursing must be fully matriculated; however, part-time study is possible. A student not completing all requirements for the degree of Bachelor of Science in Nursing within five years will be required to apply for readmission to the curriculum then current.

The School of Nursing will accept a limited number of students who are graduates of diploma or associate degree programs for matriculation in the program of undergraduate study in nursing which leads to the degree of Bachelor of Science in Nursing. Registered nurses who are so matriculated will receive educational advisement from a designated member of the faculty of the School of Nursing. Registered nurses applying for admission to advanced standing are required to submit records of previous performance in nursing, scores on scholastic aptitude tests, and selected achievement tests.

Readmission of Former Students

Former students who have for various reasons withdrawn from college and who wish to continue their collegiate careers should apply to the Duke University Office of Undergraduate Admissions with a detailed account of their activities since withdrawal from college.



Undergraduate Program: Financial Information

Fees and Expenses

The prospective student who seeks the optimum opportunity in higher education will not be a bargain hunter. Certainly, some sound plan for paying the cost of college must be devised, but this plan should be formulated after the thoughtful selection of an institution has been made. No college or university can honestly say that an education at the college level is inexpensive. Most university people and the ever growing college alumni families across our nation, however, will reflect the feeling that the benefits derived from a college education constitute a handsome return on the dollars invested.

Each student going to college should analyze carefully his financial situation. In making such analysis it should be recognized that the primary responsibility for defraying the cost of an education lies with the student and his family. The typical college student can depend upon some contribution from his family's current income, a proportionate share of family savings, and anticipated income from summer employment. The number of years of study contemplated and the number of dependent children in the family should be considered in computing the funds which will be available in a particular year.

Fees paid by the students cover only a part of the cost of their instruc-

tion and of the operations of the University. Income from endowment contributions from alumni and other sources meet the balance, which constitutes more than half the cost of total college expenses.

Estimated Expenses for an Academic Year

Certain basic expenditures are to be considered in preparing a student's budget, such as tuition, room, and board. These necessary expenditures together with a reasonable amount allotted for miscellaneous items such as books and supplies are shown below:

Tuition	\$2,100.00	Books and Supplies‡	\$120.00
Room Rent (Double)*	360.00	Activities‡	18.00
Board†	550.00	Uniforms§	93.00

Although these amounts are based upon present existing charges, they are subject to change. The prospective student should contact the Office of Admissions for more current information.

The total expense involved in attending the University depends to a large extent upon the tastes and habits of the individual. It is realistic to suggest that the average Duke student, however, can plan a budget of \$3,600.00 for the academic year. Travel costs, clothing purchases, and other optional major expenditures would have to be added to this estimate.

Tuition and Fees

Tuition. The tuition of \$1,050.00 is due and payable not later than the date of the beginning of a particular semester after the day of registration. No refund of the tuition will be made except in the event the student involuntarily withdraws to enter the armed services or dies during the course of the semester.

Bills may be sent to parents or guardians provided the Bursar has been requested in writing to do so. Failure to pay bills on or before the due dates will debar the student from class attendance until the account is settled in full.

No records are released and no student is considered by the faculty as a candidate for graduation until she has settled with the Bursar for all indebtedness.

Registration Fees and Deposits. New students, on notification of acceptance, are required to pay a non-refundable first registration fee of \$20.00 and to make a deposit of \$50.00. The \$50.00 deposit will not be

*Hanes House.

†No board charge for juniors and seniors. These students pay for each meal individually. Meal costs may be estimated at \$75.00 per month as a minimum.

‡Approximate cost.

§Approximate initial cost to sophomore for uniforms.

refunded to accepted applicants who fail to matriculate. For those who do matriculate, \$25.00 of the deposit serves as a continuing room deposit for successive semesters, and the remaining \$25.00 as a continuing registration deposit.

Readmission. Students who have been readmitted to the University after an absence of one or more semesters, on notification of readmission, are required to make the \$50.00 room and registration deposit.

Late Registration. Students who register in either semester at a date later than that prescribed in the Calendar of the colleges must pay to the Bursar a fee of \$10.00.

Refunds. The \$25.00 preregistration deposit will be refunded to students (1) whom the University does not permit to return, (2) who graduate, or (3) who request the refund at the time of preregistration, thus indicating their intention not to return for the following semester. The preregistration deposit will not be refunded to students who preregister and fail to enter the following semester on schedule.

ROTC Deposit. An Air Force ROTC deposit of \$20.00 is required of students enrolling in Air Science to cover possible loss of military equipment issued to them. This deposit is refunded to the student upon return of issued equipment.

Special Students. In the regular academic year students who register for no more than two courses in a semester are classified as special students. Special students will be charged at the following rates: One course, \$210.00; half-course, \$105.00; quarter-course, \$52.50; one course plus laboratory or precept, \$280.00. Registration for more than two courses requires payment of full tuition.

Auditors. Auditing of one or more courses without charge is allowed students paying full fees, provided that the consent of the instructor is obtained. Students who are enrolled for not less than one nor more than two courses may audit other courses by payment of \$35.00 for each course audited. With the consent of the appropriate instructor and the Registrar, alumni may audit undergraduate courses for \$35.00 for each course.

Duke Employees. Certain full-time employees with two or more years of service with the University may request permission to take up to two courses during any one semester. Permission may be granted based on the individual merits and circumstances of each application. Employees receiving permission to take such courses will be charged one-half of the tuition rate for special students as shown above. A course may not be audited unless another course is taken for credit.

Fees for Transcripts. A student who wishes to transfer his credits from Duke University to another institution may request transcripts. A minimum fee of \$1.00, payable in advance, is charged for a single copy. A charge of 50¢ will be made for each additional copy on the same order.

Fees for Course Change. Changes in courses for reasons not arising within the University require a payment of \$1.00 for each change made.

The Summer Session

University fees for Summer Session 1970 will be charged undergraduates at the rate of \$57.00 per semester hour for those admitted with advanced standing. A double room is \$62.50 per person for a term of Summer Session and a single room is \$85.00 for the same period. The cost of laundry is approximately \$1.00 per week. A bill is sent to all pre-registered students to permit payment in advance.

Living Expenses

Housing. The rental charge* for a single room is \$480.00 for an academic year or \$240.00 per semester. The rental charge per person for a double room is \$360.00 for an academic year or \$180.00 per semester.

Food Services. The charge for board is \$275.00 a semester or \$550.00 for the academic year payable not later than the date of the beginning of each semester, also at the beginning of summer session. Students will be entitled to a refund on board on a pro rata basis only if they withdraw during the first six weeks of the semester.

Student Aid

Duke University is interested in students with ability and ambition. It is the aim of the University Financial Aid Committee and others affiliated with the Financial Aid Program to provide, insofar as possible, the financial assistance required by students accepted for entrance who are unable to defray the cost of college from their own resources. The assistance is made available in the form of scholarships, grants-in-aid, loans, and part-time employment. It should be noted that admission decisions are made first; then among those to be accepted, all who have applied for financial aid are considered. Therefore, it should be clearly understood that *no preference* is given to applicants for admission who are not aid applicants.

Application Procedure

All requests for applications for scholarships, grants-in-aid, industry scholarships, or remission of tuition should be addressed to the Office of Undergraduate Admissions and Financial Aid, Duke University, Durham, North Carolina 27706.

*Hanes House.

All candidates for scholarships and grants-in-aid must submit an official Application for Admission to the University and the Application for Scholarship to the Office of Undergraduate Admissions. Scholarship candidates who desire to be considered for maximum value of scholarships on the basis of financial circumstances are required to submit the "Parents' Confidential Statement" of the College Scholarship Service which may be obtained from high school guidance personnel or upon request from the Admissions Office.

Scholarship candidates should initiate their applications during the fall semester of their senior year of study in secondary schools. Instructions concerning the specific requirements and deadline dates will accompany the application materials sent to applicants for scholarships and grants-in-aid.

Scholarships and Awards

Angier B. Duke Memorial Scholarships. The Angier B. Duke Memorial Scholarships are intended to recognize young men and women who possess outstanding qualities of intellect and leadership. Recipients should possess superior scholastic ability of a creative nature and minds which can assimilate and utilize the knowledge they acquire. As potential leaders, they should possess unique qualities of character and personality, and a sincere interest in becoming responsible and contributing members of society. The awards will be renewable for four years, contingent upon satisfactory academic progress and citizenship.

The applicant for the Angier B. Duke Memorial Scholarship will be sent a supplementary questionnaire which he must complete and return. The information requested in this form will be employed by the selection committee in choosing finalists for the Angier B. Duke Memorial Scholarship competition. *To be considered for an Angier B. Duke Memorial Scholarship, the candidate's Application for Admission, supporting credentials, and the supplementary Angier B. Duke Questionnaire must be received in the Office of Undergraduate Admissions before January 1.*

Candidates for admission to the freshman class in Trinity College, The Woman's College, the School of Engineering, and the School of Nursing are eligible to compete for approximately 35 Angier B. Duke Memorial Scholarships.

Value: to \$3,300.00 annually.

Psychiatric Nursing Undergraduate Training Grant Awards. A limited number of Psychiatric Nursing Undergraduate Training Grant Awards are available to qualified junior and senior students. An award provides for an annual stipend plus tuition fees. Additional information about the Psychiatric Nursing Undergraduate Training Grant Awards may be secured in the Dean's office.

To qualify for an award, the student must have an above average

academic record and the potential for admission to graduate study, and must declare intent to pursue a career in the field of mental health.

Army and Navy Nurse Corps Student Program

Students in the Basic Nursing Programs may apply for appointments in the Army Student Nurse Program at the beginning of their junior year, or the Navy Nurse Corps Candidate Program at the beginning of their senior year. The appointments carry generous financial allowance. A student who participates twelve months or less serves on active duty in the respective service for twenty-four months. If two years support has been given, she serves thirty-six months.

Grants-in-Aid

Although sufficient funds are not available to assist all applicants who present requests for aid, a number of grants-in-aid are made each year to able students who need financial assistance in order to meet the cost of attending college. Any candidate for admission, therefore, who considers herself to be in such need is eligible to apply for a grant-in-aid.

Applicants for grants-in-aid will be required to submit a "Parents' Confidential Statement."

Florence K. Wilson Scholarship Fund. This fund is available to nursing students who apply for grants-in-aid.

It was established in 1961 by combining the Nurses' Alumnae Association Scholarship Fund, the students' Florence K. Wilson Scholarship Fund and contributions from the Wilson family and friends. The income of this fund is to be used for scholarships for students enrolled in the School of Nursing.

Remission of Tuition

Certain students attending Duke University are entitled to a remission of the University tuition charge. Students in this group are entitled to a maximum of eight semesters of free tuition at the undergraduate level. Each Summer Session in which work is taken and each semester spent in another institution will be counted as one of the eight allowable semesters. Only those students enrolled in the regular Nursing School program leading to a Bachelor of Science in Nursing degree are entitled to a remission of tuition charge.

Children of ministers who are members of the North Carolina or Western North Carolina Conferences of the Methodist Church are entitled to a remission of the University tuition charge, as are the children of ministers of all faiths residing in Durham County, North Carolina. This consideration is given only to children of resident members of the two

North Carolina conferences who are giving their full time to religious work.

Tuition Grants

Tuition grants are available to children of certain qualified staff members of Duke University for a maximum of eight semesters of undergraduate study at Duke University.

Loans

Loan funds held in trust by the University, as well as funds supplied by the federal government through the National Defense Education Act of 1958, are available to qualified students. Freshmen as well as upper-classmen are eligible to apply for student loans.

Loans generally mature after borrowers have left the University. Loan interest on long term loans from University funds accrues at the rate of one percent per annum from the date of each note. After a student leaves the University permanently, the loans bear interest at the rate of three percent per annum. The balance unpaid after five years bears interest at the rate of 6 percent per annum.

In addition to local loan funds, Duke University participates in the student loan program established under the provisions of the National Defense Education Act of 1958. Repayment of loan funds from the National Defense Loan Fund normally begins nine months after the student terminates his attendance at the University, with complete repayment scheduled within a ten-year period. Interest accrues at the rate of 3 percent per annum commencing nine months after the borrower ceases to be a full-time student at an institution of higher education. Special benefits to those teaching in public or private nonprofit elementary and secondary schools and in institutions of higher education permit a portion of the loan to be cancelled depending upon the length of teaching service. Complete details regarding the student loan program may be obtained by writing directly to the Student Loan Office.

Students applying for loans are selected on the basis of character, scholastic attainment, personality, and degree of financial need. A student in residence may not, without special permission, own or operate an automobile during the academic year for which the loan is granted. Loan applications must be submitted not later than July 1, preceding the academic year for which assistance is requested.

Undergraduate Registration and Academic Regulations

Registration

Students in residence are required to submit, not later than the date of the spring registration, cards showing their selection of courses for the following year. Evidence of the payment of the continuing preregistration deposit of \$25.00 is required before the card may be submitted. These cards, approved by the designated academic adviser, are filed for permanent record in the Central Records Office. Students who do not select their course for the following year at the time appointed must be readmitted to the college by application to the Committee on Admissions. The same regulations, with the exception of the advance deposit, apply to registration for the spring semester.

Students who register in either semester at a date later than that prescribed must pay to the Bursar a fee of \$10.00. They are counted as absent in the work they have missed in the professional courses to which they are admitted, and these absences carry the same penalty as do other absences from the professional courses. Changes in courses for reasons not arising within the University require a payment of \$1.00 for each change made. No course may be elected later than one week after the opening of the semester, and no student may be admitted to any class without an official enrollment.

Orientation Program

All freshmen and transfer students are required to participate in the activities of Orientation Week. The program includes placement tests, orientation lectures, physical examinations, social events, special religious services, registration, and enrollment. New students who miss the whole or a part of the Orientation Program place themselves at a serious disadvantage at the very outset of their college career.

Identification Cards

On Registration Day each student is issued an identification card which she should carry at all times. It secures library privileges, student health services, entry into certain athletic events, and admission to other functions to which student status entitles her. A student is expected to present her card at the request of any authorized official of the University.

Identification cards are not transferable and the loss of this card should be reported immediately to the School of Nursing Records Office. The cost of a new card is \$5.00.

Academic Regulations

Four academic years (eight semesters) in residence is the normal amount of time a student may take to earn the degree of Bachelor of Science in Nursing. Five years is the maximum to be permitted, unless the student has previously been admitted as a special student.

Academic progress is measured in terms of semester-courses (and half-courses and double-courses) satisfactorily completed rather than in terms of semester hours. (A semester-course is roughly the equivalent of three or four semester hours, under the semester hour system.) The normal academic load is four courses per semester. A student must have the permission of his academic adviser to take fewer than four courses per semester, or to take more than five courses.

Grades and Credits

Incomplete Work. If because of illness or other emergency a student's work in a course is incomplete, he may receive an *I* for the course instead of a final grade. Incomplete courses must be completed before the close of the succeeding semester; otherwise the *I* is converted to an *F* and the course must be repeated in class if the student is to receive credit for it. In case a student whose work is incomplete is also absent from a final examination, she receives an *X* for the course.

Withdrawal. The letter *W* is used to indicate official withdrawal from

a course. If a student drops a course without permission from his or her academic adviser, the grade for that course is recorded as *F*. If he drops before six-weeks grades come out and with permission from his academic adviser, the letter *W* is used to indicate withdrawal. If a student withdraws with permission after six-weeks grades are out and is failing the course, the grade for that course is recorded as *F*, unless, in the judgment of the Dean, circumstances do not justify this penalty.

Reports. Reports on proficiency in academic work are sent to parents or guardians after the examinations at the end of each semester. In addition, six-weeks advisory grade reports on freshmen are mailed each semester.

Failing Grades. Failing grades appear on the transcript, but graduation depends on courses passed, and is not governed by those failed.

Transfer Credits. Credit for work completed from regionally accredited, degree-granting institutions is evaluated for transfer value in relation to the curriculum requirements of the School of Nursing. Courses in which grades of less than *C* have been earned are not acceptable for credit. Credit for liberal arts courses is determined by the department concerned. No credit is given for work completed by correspondence. Any extension work must be approved by the Dean.

Residence Requirements. The minimum time that any student may spend in residence before receiving a degree of Bachelor of Science in Nursing is two years; these must include the student's last two years at Duke, unless the student has spent a certain period of time in study at another institution in this country or abroad, having received prior approval by the Dean of the School of Nursing.

Requirements for Continuation and Graduation

A student who fails three or more courses in the first semester of the freshman year or who fails two or more courses in any subsequent semester must leave the University for at least two semesters. The double summer session may be counted as a semester. The student's return must be approved by the Dean of the School. If the student thereafter fails two or more courses in a semester he will be permanently dismissed from the University. In addition, a student may be dismissed temporarily or permanently by the Dean of the School for failing to make satisfactory progress toward graduation. Any student excluded from the University under the provisions of this proposal may at his request have his case reviewed by the Undergraduate Studies Committee.

A student must have passed a minimum of 14 semester-courses before beginning the professional curriculum (upper division), including all required lower division courses. Ten of these courses required for advancement into the professional curriculum must have been passed with a *C*— or better grade.

For graduation a student must have passed at least 32 semester-courses (or a combination of semester-courses, half-courses, and double-courses that would be equivalent to 32 semester-courses), including an approved curriculum. Twenty-two of the 32 courses required for graduation must be passed with a C— or better; and an over-all C average or higher must be attained in the upper division professional curriculum.

Class Attendance Regulations

The attendance regulations specifically place the responsibility for class attendance upon the individual student. A student is expected to attend his classes regularly and punctually. It should be recognized that one of the most vital aspects of a residential college experience is attendance in the classroom, and that the value of this academic experience cannot be fully measured by testing procedures alone. The members of the student body are considered sufficiently mature to appreciate the necessity of regular attendance, to accept this personal responsibility, and to demonstrate the kind of self-discipline essential for such performance, and conversely, to recognize and accept the consequences of failure to attend. Instructors are privileged to refer to the Dean for appropriate action any student who in their opinion is causing his work or that of the class to suffer because of absences or excessive tardiness.

Absences from classes due to illness will be excused when certified by a proper medical official. Absences from classes due to authorized representation of the University may be excused. Officials in charge of groups representing the University are required to submit names of those persons to be excused to the appropriate dean's office forty-eight hours in advance of the hour when their absences are to commence.

Leave of Absence

An upperclassman in good standing may apply in writing to his dean for approval to take a leave of absence. If granted, the leave will begin at the end of the semester in which application is made and will last for one or two semesters. While on leave a student must inform his dean of his address and preregister by mail for the semester he is due to return. A student failing to preregister will be considered to have withdrawn from the University and will have to apply for readmission.

Eligibility for Academic Honors

Dean's List. In recognition of academic advisement, students who earn the equivalent of a 3.00 q.p.r. or higher on a semester's work of not less than the minimum academic load are placed on the Dean's List.

Class Scholars. A student in each class of the School of Nursing who

achieves the highest academic standing on at least a normal course load for each academic year shall be designated a Class Scholar.

Class Honors. To be eligible for Class Honors a student must earn, during the year, credit for at least the minimum academic load permitted by the college in which she is registered. All courses on which a student receives a grade are counted in the determination of Class Honors. Students in the freshman, sophomore, and junior classes who earn the equivalent of a 3.50 or higher q.p.r. for the academic year are eligible for Class Honors.

Transfer to or from Schools within the University

A student in good standing may transfer from one Duke undergraduate school or college to another only upon written application and with the approval of the appropriate officials of the schools involved. The review of a student's request to transfer will involve consideration of her general academic standing, citizenship record, and relative standing among the group of students applying for transfer.

A request to transfer should first be made to the academic dean in the school in which the student is presently enrolled. The school or college to which transfer is sought will give academic counseling to a student as soon as the intention to apply for transfer is known, although no commitment will be implied in doing so.

If a student enrolled in the School of Nursing desires to transfer to The Woman's College, she should consult with the director of undergraduate studies of the school. A written request should be submitted to the Dean of Undergraduate Instruction in The Woman's College by March 1, along with a written recommendation from the Dean of the School of Nursing.

A student in The Woman's College considering transfer to the School of Nursing should consult with the appropriate officials of the school as well as with her academic dean in The Woman's College.



Undergraduate Courses of Instruction

The following courses, available to students who entered the School of Nursing prior to September, 1968, will be discontinued after academic year 1970-71.

N 160. *Social Foundation of Nursing*. A survey of major historical, philosophical, and sociological factors which have affected Nursing and Nursing Education. The purpose of the course is to give the student a better understanding of the place of nursing in present day society and the responsibilities of the individual nurse to society. One course.

N 170. *Psychiatric Nursing*. This course focuses on dynamic psychiatric nursing. It is taught within the frame of reference of interpersonal theory, communication theory, problem solving process and dynamic psychiatry. It provides opportunities for learning under supervision through experiences in a one-to-one relationship with a hospitalized psychiatric patient and through experiences with a small group of hospitalized psychiatric patients. Two courses.

N 171. *Psychiatric Nursing Group Work*. This is an honors elective course designed to provide knowledge of advanced concepts and principles related to dynamics of small group functioning. It provides opportunity for experiential learning as a group member and for experiences as a group leader with a small group of psychiatric patients. Half-course.

N 180. *Public Health Science*. Major emphasis is on the application of

public health science to nursing. The course builds upon content presented in N 155, presents more depth in the area of biostatistics, and introduces material from the environmental sciences. Prerequisite: N 155. One course.

N 181. *Public Health Nursing*. Students acquire knowledge of the philosophy, principles, and processes of nursing as applied in a community setting. They have the opportunity to apply this knowledge through selected learning experiences in the Durham community. Prerequisite: N 155. Two courses.

N 191. *Team Leadership and Intensive Nursing Care*. The course is designed to assist the student to use concepts of administration in a team leadership role, to increase his competency in complex nursing care and to apply simple scientific methodological skills to the selection and systematic investigation of a problem in nursing. Two courses.

The following courses are offered to nursing students matriculating under the new curriculum who have entered since September, 1968:

N 97, 98. *Human Ecology I and II*. An interdisciplinary course in the natural sciences covering the impact of a changing physical and biological environment upon man. Two courses. Gratz

N 101. *Introduction to Theoretical Framework for Nursing*. Major concepts and principles basic to nursing with emphasis on the health continuum, growth and development, stress, adaptive responses, communication theory, structure and process of groups (family, community, work groups, etc.). Practicum in a variety of settings designed to enhance understanding of concepts taught: application to nursing situations. Prerequisite: admission to junior year; concurrent with N 103. Two courses. Staff

N 102. *Theoretical Framework for Nursing*. Continued exploration of concepts and principles introduced in N 101. Consideration of (1) patterns of adaptive responses which constitute major health problems in a variety of age groups, and (2) societal trends and changing health needs, their influence on nursing and health care. Theoretical application to increasingly complex nursing situations. Prerequisite: N 101, N 103; concurrent with N 104. One course. Staff

N 103. *Introduction to Nursing Process*. Theory and utilization of the nursing process. Integration of substantive content and the nursing process. Application in giving care to patients of different ages, in differing health problems in a variety of settings. Introduction to the health disciplines; beginning practice as a team member. Prerequisite: admission to junior year; concurrent with N 101. Two courses. Staff

N 104. *Nursing Process*. Continued integration of substantive content and the nursing process in increasingly complex nursing care situations. Experiences in (1) team member roles in providing preventive and therapeutic nursing care, (2) collaborative roles with other members of

health teams, and (3) utilization of concepts of group structure, function, and process in exploring methods by which groups of people seek, use and administer health care. Prerequisite: N 101, N 103; concurrent with N 102. Two courses. *Staff*

N 149. *Nursing Elective*. Experience in guided individual study. Prerequisite: consent of the instructor. Half-course or one course.

N 150. *Nursing Elective*. Experience in guided individual study. Prerequisite: consent of the instructor. Half-course or one course.



The Master's Program in Nursing

Purpose

The Graduate School of Duke University offers the degree of Master of Science in Nursing (MSN).

The general purpose of the program is to enable and encourage students to explore, develop, and test theories of nursing practice based on scientific processes, to the end that graduates will continue to seek and extend knowledge about nursing. Opportunities are provided for each student to progress toward his goals in a selected nursing specialty, such as gerontological nursing, community mental health, or geropsychiatric nursing. Concentration upon a limited area helps to deepen understanding and afford experience which will serve as a model for continued learning.

Preparation to function as a nurse specialist or teacher is provided through elective courses, theoretical exploration, and experiences appropriate to the needs and interests of the individual student. The program incorporates and encourages independent study, innovative approaches, and evaluative methods.

Admission

Requirements

1. Completion of a National League for Nursing (NLN) accredited baccalaureate degree program in nursing. (Provisional admission may be granted to applicants not fully meeting this requirement.)
2. A record of undergraduate study that meets general standards for admission to graduate study at Duke University.
3. Registration for the practice of nursing in one of the fifty states.
4. Three recommendations from persons who are acquainted with the applicant's professional ability and capacity for graduate study.

In addition, the individual is encouraged to submit scores from the Graduate Record Examination. Personal interview is also desirable. The applicant should be in good health.

Procedures

A student seeking admission to the Graduate School should request the Dean of the Graduate School to send an application blank. This should be filled out completely and returned promptly. In addition he should provide the following supporting documents: (1) two copies of a transcript or transcripts of all his undergraduate and graduate work mailed directly by the registrar to the Dean; (2) as soon as possible, two supplementary transcripts showing completion of work in progress when the earlier transcript was made; (3) three letters of recommendation, written on the forms provided, by persons best qualified to judge him as a prospective graduate student and mailed directly to the Dean; and (4) scores on the Graduate Record Examination if available.

All applicants except foreign students applying from outside the United States, non-degree students, and former students in the Graduate School must include the application fee of \$10.00 in check or money order payable to Duke University.

Notification of Status

When admission is approved, the student will receive a letter of admission and an acceptance form. The process of admission is not complete until the statement of acceptance has been returned.

Applicants who are admitted will be offered full admission, provisional admission, or non-degree admission. *Provisional admission* is offered to students who (1) appear to warrant admission but do not fully comply with admission requirements, for a trial period of one semester or a minimum of 12 hours of course work, or (2) are admissible except that

the application lacks a letter of recommendation, a supplementary transcript, required test scores, or some other required information. *Non-degree admission* is offered to students who (1) have no intention of taking an advanced degree at Duke University but wish to take courses for accreditation, for transfer to other institutions, or for other purposes, or (2) do not fully meet admission requirements but wish to further their academic interests. Graduate credit earned under *provisional status* may be applied toward an advanced degree at Duke University if and when the student is granted full admission; graduate credit earned under *non-degree* status may not be applied toward an advanced degree at Duke University.

Deadlines for Applications

It is the applicant's responsibility to make certain that his application is completed and in order before the dates specified. Because applications cannot be reviewed until all supporting documents are filed, applications should be submitted at least *two weeks* before the closing dates listed below:

Fall semester, admission and award.....	February 15
Fall semester, admission only.....	August 3
Spring semester, admission only.....	January 1
Summer Session,* First Term.....	May 12
Summer Session,* Second Term.....	June 19

Curriculum

The emphasis in the program is the exploration of the theoretical foundation for nursing practice based on scientific processes. Freedom to select courses permits concentration of study appropriate to the interests, abilities, and goals of each student.

The core content provides the individual with an opportunity to become familiar with scientific methods relating to nursing practice, to design nursing research projects, and to begin to develop theory of nursing practice in a selected area.

Throughout the year, focus will be on clinical practice; therefore, the student will use the laboratories located in the medical complex and in the community to explore and test theories.

The program of study covers four semesters. Students are admitted in the fall of each year.

*Students seeking admission to the Graduate School for study in the Summer Session should make application to the Dean of the Graduate School as well as to the Director of the Summer Session.

Required Courses

Nursing Courses

	Units
Development of Nursing Theory	6
Methods of Research in Nursing	3
Nursing Elective	3
Independent Study in Nursing	5
Thesis Research	4

Cognates

Human Behavior and Group Process	3
Elementary Statistics	3
Advanced Statistics	3
Electives, Non-Nursing	12
42 units minimum requirement	<u>42</u>

Suggested Course Sequence

First Year			
First Semester	Units	Second Semester	Units
Development of Nursing Theory	3	Development of Nursing Theory	3
Human Behavior and Group Process	3	Methods of Research	3
Elementary Statistics	3	Electives	6
Elective	3		
Second Year			
First Semester	Units	Second Semester	Units
Nursing Elective	3	Thesis Research	4
Advanced Statistics	3	Independent Study in Nursing	5
Elective	3		

Academic Regulations

Registration

All students must register (1) who enter course work or residence for credit; (2) who have completed minimum requirements for an advanced degree, but continue to use the facilities of the University in their research; (3) who have *in absentia* status; and (4) who wish merely to audit a course or courses.

Residence

Although ideally graduate study consists principally of individual reading, research, and laboratory experimentation under guidance, academic progress in the United States is generally measured and recorded in terms of course hours and credits. Credit for courses and seminars, research, and residence, and corresponding tuition and fees are stated in terms of units. According to conventional measurement, one unit is equivalent to one semester hour. The term *residence* designates full-time study and research in close proximity to the facilities provided, as opposed to part-time study incidental to a full-time occupation. For purposes of satisfying the residence requirement of the various degrees, *residence* of one year is defined as two successive academic semesters of *no less* than nine units registration each semester.

Credits Earned Outside This Graduate School

1. *Graduate Credit Earned before the A.B. Degree Is Granted.* Ordinarily no credit will be allowed for graduate courses taken before a student has been awarded his A.B. or B.S. degree. However, an undergraduate student at Duke University who, at the beginning of his final semester, lacks no more than nine semester hours of fulfilling the requirements for the A.B. or B.S. degree, may obtain permission from the Dean of the Graduate School to enroll for graduate courses sufficient to bring his total program to fifteen hours a week. Such graduate courses will be credited toward the A.M., M.S., M.Ed., M.S.N., or M.A.T. degree, provided that the student meets the requirements for admission to the Graduate School, and that he is duly registered in the Graduate School at the beginning of the semester in which he intends to earn graduate credit.

2. *Transfer of Graduate Credits.* Credit for graduate course work earned at another institution will be determined only after a student has spent one semester at Duke University. After completing his first semester, the student through his director of graduate studies should file a request that his credits be reviewed and a decision be made.

3. *Reciprocal Agreements with the Consolidated University of North Carolina and with North Carolina College.* Under a plan of cooperation between the University of North Carolina and Duke University, students regularly enrolled in the graduate schools of the University of North Carolina during the regular academic year, and paying full fees to that institution, may be admitted to a maximum of two courses per semester in the Graduate School of Duke University upon payment of a nominal registration fee of two dollars and of any other special fees regularly required of all students. Under the same arrangements, students in the Graduate School of Duke University may be admitted to course work at

the University of North Carolina. A similar arrangement exists with North Carolina College.

Grades

Grades in the Graduate School are as follows: *E*, *G*, *S*, *F*, and *I*. *E* (exceptional) is the highest mark; *G* (good) and *S* (satisfactory) are the remaining passing marks; *F* (failing) is below passing; and *I* (incomplete) indicates that some portion of the student's work is lacking, *for an acceptable reason*, at the time the grades are reported. The instructor who gives an *I* for a course specifies the date by which the student must have made up the deficiency, in no case more than one calendar year from the date the course ended. If the course is not completed, the grade of *F* is entered upon the student's record unless his appeal to the Dean for the grade *No Credit* is approved. The grade of *Z* indicates satisfactory progress at the end of the first semester of a two-semester course. It will be changed to whatever grade is appropriate upon the completion of the course. A grade of *F* in a major course normally occasions withdrawal from a degree program not later than the end of the ensuing semester or term; a grade of *F* in a minor course occasions academic probation.

Courses Primarily for Undergraduates

Students granted provisional admission and others whose preparation is found deficient may on occasion be required as part of their program to take undergraduate courses as prerequisites to continued graduate study. Undergraduate courses thus taken and others elected by the student will carry no graduate credit.

In exceptional cases, 100-level courses *outside the major department* may be taken for graduate credit to a maximum of two one-semester courses or one year-course not exceeding a total of eight units, when approved by the director of graduate studies in the major department and in the department in which the course is listed and by the supervisor of the program. In order to receive credit for any such undergraduate work, the graduate student must normally earn a grade of at least *B*.

Financial Information

Tuition and Fees

The following table shows the tuition and fees collected from all students. All charges for each semester are due and payable, unless otherwise specified, at the time of registration for that semester and are subject to change without notice. No student is admitted to classes until ar-

rangements have been made with the Bursar of the University for the settlement of his tuition and fees.

Tuition (\$63.00 per unit)	\$945.00
Athletic fee, optional, per year, not including federal tax, payable in the fall semester	25.00
Binding fee, three copies of thesis or dissertation, other copies optional, \$5.00 a copy	15.00
ETS Foreign Language Test, each administration, payable to the University Counseling Center	8.00
In <i>absentia</i> fee, due on date of registration, one unit per semester	63.00
Late registration fee	10.00
Microfilming fee, doctoral degree only, upon final submission of dissertation	25.00

Special Tuition Rates for Teachers and Others

The Graduate School recognizes a special obligation to encourage the following types of students in their professional and personal advancement: (1) members of the faculties and administrations of the neighboring public schools and colleges, currently engaged in *full-time* school work while taking courses in the Graduate School, (2) ministers of neighboring churches, (3) wives of Duke faculty members, (4) *full-time* employees of Duke University who are paid on a monthly basis *throughout* the year and have been employed for two years. The reduced tuition rates specified below do not apply to teachers and ministers while on leave of absence, nor to holders of fellowships, scholarships, or graduate and research assistantships, nor to part-time instructors.

Persons eligible for the reduced tuition rate must meet the admission standards required of all graduate students and must be admitted to the Graduate School. They may enroll for one or two courses per semester (in no case totaling more than seven units) upon payment of a fee of \$5.00 for registration for each semester and tuition of \$31.50 per unit of credit or an audit fee of \$31.50 per course. Residence requirements cannot be fulfilled at the reduced rate.

Living Accommodations*

Housing

Duke University strives to provide comfortable, attractive living accommodations for graduate-level resident students, both married and unmarried.

*Information described herein pertaining to graduate housing facilities is subject to change prior to September 1970.

The Graduate Center houses men and women enrolled on a full-time basis in the Graduate School and the professional schools. Graduate women are also assigned to Hanes Annex, a residence hall, and to Town House Apartments located between the West and Woman's College campuses.

The Graduate Center houses 197 male graduate students, 56 women graduate students, and 117 women undergraduates. Commons facilities on the main floor are shared by men and women.

Hanes Annex has 39 beds for graduate and allied medical students. This building is used by seniors in the School of Nursing. Commons areas are jointly used by the two groups.

Rooms in residence halls are normally rented for the academic year, but for no period less than one semester or specified term.

Town House Apartments include thirty two-bedroom units, each furnished for three graduate women students. Two students occupy the master bedroom and the third occupies a smaller bedroom. A living room, kitchen, and one and a half baths complete these attractive living units. No effort is made by the Office of Housing Management to assign bedroom space within each apartment.

The University now leases 104 two- and three-bedroom apartment units for use by married graduate students. As compared with similar apartment properties in the Durham area, rental of the Duke-leased units provides financial advantage to most students accepting leases through the University Department of Housing Management.

Rooms in residence halls and spaces in Town House Apartments or other rental units may be reserved by applicants only if they have been accepted by the Graduate School, and after the required \$25 room or security deposit has been paid to the University. The initial room or security deposit is required with the application and is held until the room or apartment is vacated. Application forms and detailed information on graduate housing will be mailed when the Graduate School has notified the Department of Housing Management of official acceptance of the student. Single women may express a choice for the type of housing desired. Completed applications for rooms and apartments are to be returned, with required deposits, to the Department of Housing Management, Duke Station, Duke University, Durham, N.C. Assignment priority is established by the date of receipt of completed applications with deposits in this office.

Regulations governing occupancy of rooms and apartments will be provided by the Department of Housing Management at the time application forms are forwarded to accepted students. Occupants within each type of housing are expected to comply with the appropriate regulations.

Detailed information about University housing facilities for single and married students, including rental rates, will be provided upon request by

the Department of Housing Management, Duke University, Duke Station, Durham, 27706.

Food Services

Food service on both the Woman's College Campus and the West Campus is cafeteria style. The dining facilities on the West Campus include one straight-line cafeteria with multiple-choice menus, a free-flow service area which includes cafeteria counters as well as a grill, and a table service dining room called The Oak Room where full meals and *a la carte* items are served by waitresses. The Graduate Center has a cafeteria open at meal hours, and a coffee lounge which is open until 11:00 p.m. Because of the large number of those served in the dining halls, it is not possible to arrange special diets for individual students.

Services Available

Medical Care

The complete medical facilities of the Duke University Medical Center are available to all members of the University community. To secure the benefits of the Student Health program, a graduate student during the term or semester in which the illness occurs must (1) in the Summer Session term be registered for at least one unit of research or three units of course work, (2) prior to completing minimum residence requirements be registered for at least nine units per semester and thereafter as long as full-time status is maintained. (See the section on Residence.) Students are not covered during vacations and their dependents and members of their family are not covered at any time. Care is provided for men at the Student Health Office in Duke Hospital and for women at the Woman's College Infirmary and in the Student Health Office.

The service provided includes hospitalization in Duke Hospital, when recommended by the Hospital staff, to a limit of thirty days in the fall and spring semesters—six days in the Summer Session; medical and surgical care under the supervision of a senior physician or surgeon; drugs, X-ray work, and ward nursing. Students pay for board while in the hospital. Excluded from the service are refraction of eyes, treatment of teeth, and of all chronic and pre-existing conditions, and elective surgery.

Off-campus injuries and accidents are not covered by Student Health. Graduate students are urged to carry adequate health insurance to supplement Student Health Program services. If students have insurance providing hospitalization, surgical, or medical benefits, the benefit shall be applied to the cost of their medical care.

Students whose course-load entitles them to full coverage under the Student Health program are eligible for a complementary insurance policy which then comprises protection for the entire calendar year. Concerning this complementary policy inquire of the Dean of the Graduate School. *Foreign students are required to hold this or another acceptable policy.*

The Duke University Counseling Center

Through the Counseling Center, the University provides a professional counseling service designed to aid students in gaining a better understanding of themselves and the opportunities available to them. Counseling is available in the areas of career planning, educational opportunities and personal and social adjustment.

The Center maintains files of educational and vocational information related to career planning, graduate educational programs and fellowships, and study aids.

National and University-wide testing programs are administered by the Center. A continuing program of research in the areas of counseling and testing is also carried on by the staff of the Center.

Office of Placement Services

Duke University maintains the Office of Placement Services which acts as a liaison between the University and potential employers in business, education, and government. All services are offered without charge to Duke students and alumni. The staff is available to talk with graduate students about their future professional plans. Graduate students who wish to register with the office are offered an opportunity to assemble a complete dossier of academic records and recommendations to supplement applications for positions and to have a permanent file for future reference. Pertinent recommendations are far easier to accumulate during the time a student is enrolled at Duke. Interviews with representatives visiting Duke are scheduled throughout the year through the Office of Placement Services for those students who have registered. Copies of academic records are released only with the permission of the individual.

Student Activities

Graduate students new to Duke University may be reminded that they are welcomed to use such recreation facilities as swimming pools, tennis courts, golf course, and to affiliate with choral, drama, and religious groups. They may become junior members of the American Association

of University Professors and may affiliate with Phi Beta Kappa and social fraternities. Wives of graduate students may join the very active Graduate Wives Club.

A full program of co-curricular and recreational activities is presented by the University Religious Council, Y.M.C.A., Y.W.C.A., Student Union, Student Government Organizations, and Clubs. Most programs are open to the entire university community. Inquiries should be directed to the Student Activities Office—202 Flowers Building.

The Information Center, Page Box Office, coffee house, publications offices, art gallery, meeting rooms, lounges, music listening rooms, and recreational facilities are located in the Flowers and Union Buildings.

Graduate Courses of Instruction

N 251. *Human Behavior and Group Process*. This course focuses on the various theories of personality development and the subsequent development of normal and abnormal behavior. The course is oriented as an overview with an interdisciplinary approach encompassing theoretical hypotheses from psychology and descriptive psychiatry. Concomitant with this, a student is given an introduction to group process and group therapy and has the opportunity of observing ongoing therapeutic groups. 3 units. *Reckless*

N 261. *Development of Nursing Theory*. An overview of the theoretical and scientific bases of nursing practice, and an introduction to development of nursing theory. 3 units. *Stone and Staff*

N 262. *Development of Nursing Theory*. Continuation of N 261; the process of deriving and testing hypotheses in the clinical or community setting. 3 units. *Stone and Staff*

N 265. *Methods of Research in Nursing*. An exploration of the research process in the area of nursing; particular emphasis on review and evaluation of reported nursing research. 3 units. *Stone*

N 333. *Curriculum Planning in Professional Nursing Schools*. A study of the bases, theoretical approaches, and evaluation of curriculum with focus on the process of curriculum change in professional nursing schools. 3 units. *Crossland*

N 335. *Gerontological Nursing*. An examination of selected gerontological research and its implications for gerontological nursing. 3 units. *Stone and Shaughnessy*

N 337. *Psychiatric Nursing*. Exploration of the scientific theories relating to the psychodynamics of mental illnesses and their implications for nursing intervention. Students may select specific areas as community mental health nursing or geropsychiatric nursing for investigation. 3 units. *Stone and Staff*

N 360. *Thesis Research*. Student initiates, conducts, and reports re-

search on a nursing problem under the direction of the faculty. 4 units.
Staff

N 365. *Independent Study in Nursing.* Culminating experience designed to enable the student to synthesize previous and concurrent study. Setting to be selected in accordance with the goals of the student. 5 units.
Staff



1970

JULY

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1971

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BULLETIN OF DUKE UNIVERSITY

Physician's Assistant Program
1970-1971



Annual Bulletins

- For *Bulletin of Information for Prospective Students*, apply to Office of Undergraduate Admissions, Duke University, Durham, N. C. 27706
- For *Bulletin of Undergraduate Instruction*, apply to the Registrar, Duke University, Durham, N. C. 27706
- For *Bulletin of the Graduate School*, apply to the Dean of the Graduate School, Duke University, Durham, N. C. 27706
- For *Bulletin of the Summer Session*, apply to the Director of the Summer Session, Duke University, Durham, N. C. 27706
- For *Bulletin of the Divinity School*, apply to the Dean of the Divinity School, Duke University, Durham, N. C. 27706
- For *Bulletin of the School of Engineering*, apply to the Registrar, Duke University, Durham, N. C. 27706
- For *Bulletin of the School of Forestry*, apply to the Dean of the School of Forestry, Duke University, Durham, N. C. 27706
- For *Bulletin of the School of Law*, apply to the Dean of the School of Law, Duke University, Durham, N. C. 27706
- For *Bulletin of the Marine Laboratory*, apply to the Director, Duke University Marine Laboratory, Beaufort, N. C. 28516
- For *Bulletin of the School of Medicine*, apply to the Dean of the School of Medicine, Duke University, Durham, N. C. 27706
- For *Bulletin of the School of Nursing*, apply to the Dean of the School of Nursing, Duke University, Durham, N. C. 27706
- For *Directory of the Officers, Faculty and Staff*, apply to Office of the Secretary, 215 Allen Building, Duke University, Durham, N. C.
- For *Bulletin of the Graduate School of Business Administration*, apply to the Dean of the Graduate School of Business Administration, Duke University, Durham, N. C. 27706
- For *Bulletin of the Physician's Assistant Program*, apply to the Director, Physician's Assistant Program, Duke University, Durham, N. C. 27706
- For *Bulletin of Faculty Publications*, apply to the Office of the Vice Provost for Academic Administration, Duke University, Durham, N. C. 27706
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Cover design is adapted from a photograph of a carving in the entrance to Crowell Quadrangle.

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Physician's Assistant Program
1970-1971

Durham, North Carolina 1970

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Physician's Assistant Program Calendar 1970-1971

1970

September

- 14 Monday—Registration 8:30 a.m. Mandatory for all students; 1:00 p.m. Orientation for new students.
- 15 Tuesday—Classes begin
- 28 Monday—Board examinations begin, second year students

October

- 1 Thursday—Board examinations end
- 2 Friday—Graduation ceremonies
- 21 Wednesday—Classes end, Phase One
- 22 Thursday—Examinations begin, Phase One
- 24 Saturday—Examinations end, Phase One
- 26 Monday—Classes begin, Phase Two

November

- 25 Wednesday—Thanksgiving recess begins, first year students only*
- 30 Monday—Classes resume

December

- 18 Friday—Christmas recess begins, first year students*

1971

January

- 4 Monday—Classes resume

March

- 26 Friday—Spring recess begins

April

- 5 Monday—Classes resume
- 24 Saturday—Classes end, Phase Two
- 26 Monday—Examinations begin, Phase Two

May

- 1 Saturday—Examinations end, Phase Two
- 3 Monday—Classes begin, Phase Three
- 10 Monday—Rotations schedule posted

*A two-week vacation period will be scheduled for each student during the month of June. Arrangements for additional time off including Thanksgiving, Christmas, New Year's, Easter, and other holidays must be made with the faculty in charge of each rotation.

June

- 9 Wednesday—Classes end, Phase Three
- 10 Thursday—Examinations begin, Phase Three
- 12 Saturday—Examinations end, Phase Three
- 14 Monday—Vacations begin, first year students only*
- 25 Friday—In-hospital rotations end, second year students



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General Information

History and Development

Duke University's concept of the Physician's Assistant Program developed in the early 1960's following an unsuccessful attempt to initiate a postgraduate education program for physicians. When Dr. Eugene A. Stead, then chairman of the Department of Medicine at Duke and founder of the Physician's Assistant Program, analyzed the reasons for the failure, he discovered that practicing physicians had no time they could reasonably set aside for the purpose of education. Dr. Stead felt that perhaps ancillary health personnel could be trained to competently assume many of the physician's tasks, thereby giving them more time. During the ensuing months of research Dr. Stead became aware that ancillary personnel were being trained to do many technical jobs within the Medical Center which had previously fallen within the sole realm of physician responsibility.

As a result of Dr. Stead's observations, on April 17, 1965, Dr. Barnes Woodhall, then Vice Provost for Medical Affairs at Duke University, appointed an *ad hoc* committee chaired by Dr. Andrew G. Wallace, Assistant Professor of Medicine, to evaluate the existing programs and the manpower needs. This committee met on four occasions during the spring of 1965 and came to the following conclusions: (1) the need for extensive numbers of highly trained technical personnel existed both within and outside the Medical Center; (2) two types of allied health

personnel were needed, one very highly skilled and limited to a specific area and the other a more advanced individual with a broad and sophisticated background; (3) there existed the need for a core curriculum to allow for academic advancement and variation in careers; (4) there must be an attempt to define the specific needs to resolve the individual manpower problems; and (5) there must be a method of attracting career oriented, qualified applicants and providing them with a functional and compact curriculum.

On July 1, 1965, initial limited funding was made available by the National Heart Institute to further evaluate the prospect of the physician's assistant. On October 4, 1965, four candidates, all of whom were ex-Navy corpsmen, were chosen as the initial students.

On February 1, 1966, a second *ad hoc* committee was appointed by Dr. William G. Anlyan, then Dean of Duke University Medical School, which was chaired by Dr. Stead. The purpose of this committee was to further explore the development of physician's assistants, including the types of projected roles, the educational background requirements, and the scope of their responsibilities and activities. Five days later Dr. Stead read a preview of the program before the 62nd Annual Congress on Medical Education, sponsored by the American Medical Association in Chicago.

This second committee first met under Dr. Stead's chairmanship on February 16, 1966, at which time the progress of the program was reviewed, and three primary questions were raised. These were: (1) How much of the plan for personnel training is practical and possible? (2) What sort of certification should be given to the student? (3) What provisions should be made for additional training for the student, as determined by his ultimate employment?

At the committee's second meeting the following month, three criteria were cited as the main determining factors in the ultimate success of the concept. These were: (1) physician's acceptance of physician's assistants, (2) society's acceptance of physician's assistants, and (3) the physician's assistants' individual competence.

Throughout 1966, meetings of the second committee were spent in providing a continuing review of the program, researching possible sources of funding, and beginning an in-depth search into the legal aspects in the use and development of such personnel.

On April 13, 1966, in response to an inquiry from the committee, the Attorney General's Office ruled in reference to the Medical and Nursing Practice Acts that "Nothing . . . shall be construed in anyway to prohibit or limit performance by any person of such duties as specified mechanical acts in the physical care of a patient when such care and activities are performed under the orders or directions of a licensed physician, licensed dentist or registered nurse." It was the committee's recommendation at the time that regardless of this interpretation, efforts should be

made to move in the direction of modifying the Medical Practice Act so that it would allow the physician more leeway in the delegation of certain tasks.

With this information in mind, tasks that could be accomplished by an assistant were defined and a seemingly appropriate curriculum was developed. Also considered in the development of the program and curriculum was the fact that each physician is different from every other physician to such a degree that the ultimate definition of the role of an assistant would be impossible. The emphasis was, therefore, placed on developing a training program that would provide a core of vocabulary and skills for physician's assistants with the clinical emphasis on the development of an assistant for the general practitioner or general internist. It was recognized that the final training of each physician's assistant would be provided by the physician with whom he worked.

In September, 1967, the Department of Community Health Sciences assumed administration of the Physician's Assistant Program under the direction of the department chairman, Dr. E. Harvey Estes, Jr. On October 1, 1967, the program graduated its first three students, all of whom were employed in the Medical Center to facilitate evaluation studies. In April, 1968, Dr. D. Robert Howard became the first full-time director of the program. Because of numerous other activities within the Medical Center, Dr. Stead now serves as the chief advisory consultant to the program.

Although the primary goal of the program was to provide the general practitioner and general internist with an assistant, because of pressure from other physicians who participated in the teaching of these individuals, the program has since expanded its scope to include radiology, pediatrics, pathology, and medical and surgical subspecialties, with plans for further expansion to include psychiatry, geriatrics, obstetrics and gynecology, and industrial medicine.

Along with expansion of the scope of training, major in-roads have been made toward the development of an effective educational system (to include the use of programmed learning), investigation of state licensure laws for the development of model legislation to encompass the physician's assistant, and procurement of professional liability coverage for the physician, the hospital, and the university-trained physician's assistant. In addition, the last twelve months have shown a marked expansion in the size of the student body from fifteen students in the second year of training to forty students in the first year, with a planned expansion to 100 students per class by 1971.

Since the program's inception, a total of twenty-nine graduates have completed the course of instruction, of which fifteen are employed outside the Medical Center, and fourteen remain at Duke. Of those remaining in the center, three are engaged in activities which are predominantly of a research nature, and the remainder are engaged in activities pri-

marily associated with patient care. Most of the graduates assume considerable administrative duties beyond their clinical duties.

The value of these professional assistants has been readily demonstrated by their skill and attainments applicable to the specialty they serve, be it in general medicine or in some limited subspecialty. Because the assistant has been trained to supplement skills available to the health team rather than compete with the other participants, they have been readily accepted by virtually all other team members at the working level. To be sure all members of the health team including the radiological technician, medical technician, medical record librarian, physical therapist, occupational therapist, dietician, nurse, and many others have provided assistance to the physician for a more effective and efficient provision of care to a greater number of patients. The physician's assistant, however, created to support the physician in his roles in the office, the home, and the hospital has served to develop a closer liaison between the physician and the other allied health team members.

Specifically the physician's assistant is trained as a data gatherer. He can elicit detailed patient histories, do complete physical examinations, collect specimen data through intricate technical procedures such as gastric analyses, venous and arterial punctures, lumbar punctures, pulmonary function studies, and electrocardiography, and can provide accurate routine patient analyses. In addition, the physician's assistant provides such patient care services as cast application and removal, superficial wound suturing, dressing changes, and after-hours laboratory studies. The physician's assistant also aids the physician by being an extension of the physician in several locations through available communication. When the physician is in his office, the physician's assistant can be in the hospital doing routine workups, narrative summaries, and can schedule and explain diagnostic procedures to hospital patients; in the office, the physician's assistant can provide efficiency to the patient care system by collecting data for the physician ahead of time so that actual physician/patient contact can be used in a more meaningful manner. In the home, the physician's assistant can provide his physician with an extra set of sensory organs and also aid in routine management of invalid patients. Perhaps the greatest value of the physician's assistant to the physician lies in the fact that the physician has a well-trained, virtually unrestricted assistant to whom he can teach those skills and functions that will allow his particular practice to function in a more efficient, effective, and economical manner.

Relationship to the University

The students in the Physician's Assistant Program are currently registered as special students and not as Duke University undergraduate students. Access to all graduate and undergraduate library facilities is

available through the presentation of the Duke University Identification Card. After the completion of the two-year training program, the students receive transcripts of their grades and a certificate of accomplishment from Duke University Medical Center. Although this is not a degree, the credits are applicable toward a degree at other institutions.

In order to provide qualified students with the option of furthering their academic achievements so that career mobility can be more than a phrase and the career ladder can become a reality, the incorporation of an optional baccalaureate degree into the program is under consideration at this time. In addition to the successful completion of the Physician's Assistant Program, this professional training would be coupled with a broad background in liberal arts in compliance with the standards of education at the baccalaureate level.

Legal Status and Professional Liability

When the Physician's Assistant Program was initiated, it was recognized that the use of a new type of manpower in the health field might present legal difficulties in view of the licensing schemes for medical personnel. Under their power to legislate for the protection of the health and safety of their citizens, all states have enacted licensure laws to regulate the practice of medicine. These laws are typically phrased to authorize qualified physicians to perform all health care functions. Various other categories of health professionals are granted more circumscribed licenses enabling them to perform certain of these functions for which they are qualified by training and experience. Although the licensure laws for the allied health professionals were often merely permissive when first enacted, preventing only the use of a given title by the unlicensed, in many instances they have subsequently become mandatory, making criminal any action within the scope of a licensed profession by one not licensed by that profession. The initial question posed by the new program was, therefore, whether the graduates would, by their activities, infringe upon the sphere of persons performing under such mandatory licenses. The problem was considered by the North Carolina Attorney General, who in 1966 issued his advisory opinion that the performance of the projected physician-supervised activities would not contravene the licensure laws of the state. The program has operated thus far in reliance on that opinion and no difficulties have been encountered.

If it were contemplated that the physician's assistants would perform any *independent* functions, it would be necessary that some explicit exception to the Medical Practice Act be provided by the legislature to authorize such activities. Otherwise the performance of such functions would constitute the unlicensed practice of medicine, leaving the phy-

sician's assistant subject to criminal action. In addition, the physician-employer of the assistant would be subject to criminal action for aiding and abetting and possible license revocation for unprofessional conduct. The duties of the physician's assistant are, however, solely *dependent*, under the supervision of the physician, and thus developing custom and usage may be relied upon to furnish the necessary legal sanction. The physician is the party actually "practicing medicine" in this situation. In view of the expertise required in such practice — an expertise which legislatures and courts do not have — the medical profession is able to set its own standards by reference to the ordinary practices of the profession. If employment of such dependent personnel is a customary practice, even among a respectable minority of physicians, there should be minimal danger of criminal liability. The more physician's assistants are used and accepted within the medical community, the safer their position and that of the employing physician becomes.

A major concern of physicians with respect to such personnel relates to possible civil liability for their actions. Under the doctrine of *respondet superior*, the physician is responsible for negligent actions of any person in his employ or under his supervision. The physician's liability for the actions of the physician's assistant would be similar, therefore, to his current liability for the actions of his nurses and other office personnel. It is felt that his supervision should insure against negligence on their part, and his liability for their actions is indirect or vicarious. There is a possibility that the physician himself will be found negligent in delegating a particular function to the physician's assistant and will therefore be directly liable for anyone injured. If, however, the particular delegation is one customarily made, the very fact that such delegation is an ordinary practice within the profession is evidence that it was not negligent. The question of negligence *vel non* is one for the jury to answer in the particular case, on the basis of the evidence before it. The greatest danger exists initially before the practice is established as custom and usage but decreases with acceptance by the profession. In a recent Washington case, action by an unlicensed nurse, viewed against the background of the state's licensure scheme, has given rise to an inference of negligence against which custom and usage was not admissible for jury consideration. Allowing such an inference to be drawn from the mere failure to be licensed is definitely a minority approach; in North Carolina and the majority of other states, the law currently seems to be that the failure to be licensed is immaterial on the issue of negligence.

The question of professional liability coverage was investigated. Initial coverage, in 1966, was limited to coverage of the student in the Medical Center. They were found to be automatically included under the existing policy carried by the Medical Center. When the students were sent outside the Medical Center for community-based experience, companies

that provided coverage for the physician involved extended coverage to the student at the same rate the physician paid for his other employees. From 1966 to 1969 all students and graduates, while away from the Medical Center, were associated in their training or employment with physicians who carried their professional liability insurance with these companies.

In 1969, as the expanded class was assigned to physicians from coast to coast, the issue of professional liability was raised once more. As a result of these inquiries and because the issue was relevant to all related programs, various aspects of this issue were placed before the major professional liability carriers listed by the American Medical Association. These carriers expressed a willingness to furnish professional liability coverage to the physician and hospital at a negligible rate, and to the university-trained physician's assistant at a rate approximately 50 percent of that charged the employing physician.

As with any new program, there are uncertainties and unanswered questions. Although no actual legal problems have materialized in the practical operation of the program or in the use of the graduates thus far, there has been a continuing effort to clarify the issues and resolve any remaining uncertainties. A conference relating to the legal status of physician's assistants was held in Durham in the spring of 1968, and the issue was again considered at a general conference on the program held in the fall of that year. Recently funding was made available to finance a study to develop model legislative proposals which, if enacted by the state legislatures, would further regularize the position of the physician's assistant.

On October 26, 1969, a third conference, sponsored by the Department of Health, Education and Welfare in conjunction with the Department of Community Health Sciences, was held to determine the most desirable and feasible means of accommodating emerging groups of allied health professionals into the legal framework of medical practice.

Five alternative courses of action were presented for consideration: (1) maintaining the status quo (i.e., doing nothing); (2) licensing physician's assistants; (3) enacting a general statute authorizing supervised delegations by physicians; (4) special licensing of physicians to utilize physician's assistants; and (5) establishing a Committee on Health Manpower Innovations to control the development and utilization of new personnel.

During the course of the proceedings several variations of the original proposals were presented, which were discussed in conjunction with the respective proposals. The ultimate consensus of opinion was that efforts should be directed initially toward the drafting of a general statute authorizing supervised delegations by physicians, with the responsibility for determining which persons may accept such delegations vested in the State Board of Medical Examiners.

It was acknowledged that in practical fact this limited legislation might prove adequate and that it may not be necessary to proceed further. It was suggested, however, that in drafting this initial legislation as much consideration as possible be given to questions which may arise pertaining to the development or need for further regulation, should that prove necessary.

It may be that these efforts are inspired by an overabundance of caution, as the physician's assistant seems to be fitting harmoniously into the scheme of health care delivery. A definite legislative sanction would, however, go far toward curbing any lingering doubts as to the risks inherent in employing such innovative personnel.

Attitudinal Studies

With the creation of this new role within the established health care system, questions concerning the degree of self-acceptance, role-set acceptance, patient acceptance, physician acceptance, and financial savings directed toward medical expenditures were raised. The evaluations of these points have been done or have been undertaken by the Graduate School of Business Administration.

Generally speaking, both patient and physician acceptance of the twenty-nine graduate physician's assistants has been high. From an initial study in self and role-set acceptance of eight graduate physician's assistants, it became evident that self-acceptance was necessary to maintain the career commitment with role acceptance being equally necessary for generating a maximum effectiveness within the system. The area of graduate self-identity developed as an important issue. The graduates felt they could not achieve identity or individuality in the medical center resulting because of competition for responsibilities with medical students, interns, and residents. Because of this need for identity and individuality, the drive to enter practice with physicians remains high.

From this initial evaluation, the necessity of other evaluations became evident. The second study was concerned with patient acceptance of the physician's assistant. Among the patient groups studied, there were no patients who exhibited a negative attitude toward the incorporation of the physician's assistant into the health team. The degree of acceptance correlated with the patient's understanding of the physician's assistant's role and his level of high educational attainment. Thus, no patient with six years of education or less enthusiastically accepted the physician's assistant. The second extreme dealt with those patients having at least a college education, none of whom were ambivalent (low acceptance) toward the physician's assistant. This group saw a need for him and viewed the physician's assistant as beneficial to the system. The greatest acceptance occurred between these two levels of education. The patient either

identified more with the system, or created a connection between the system's efficiency and his own personal benefit.

Patients on the lowest income levels showed a less enthusiastic acceptance, which was correlated with poor understanding and educational background. Those on the highly educated, affluent levels also felt some loss in status when they paid for "just a physician's assistant." Thus acceptance was greatest in the middle socio-economic group — \$5,000 to \$8,000 annual income per year. They felt sure of their status, unlike the lower income group, and were more free in judging the situation and assessing the value of this individual to themselves. This group was also fairly well informed and sophisticated concerning health affairs. The study also showed patient acceptance to be highest in the small community clinic. Interestingly enough, it is in just this area that the doctor shortage is the most severe.

An economic analysis revealed that the yearly expenditure required for training physician's assistants is approximately the same as the expenditure required for training medical students. Of course, their training is two years as compared with the five to ten years it takes to train a physician, consequently the total cost is markedly below that for training M.D.'s. The degree of augmentation of a physician's patient care output by a physician's assistant is under objective study at this time. Augmentation figures of 75 percent have been reported from most physicians using the graduates. One assistant working in an exceptionally busy family practice group has produced nearly 100 percent augmentation. The increased income generated is used in part to pay the assistant's salary, and it is hoped that in many cases the presence of a physician's assistant will delay or prevent an increase in the cost of physicians' services to the patient.

Physician acceptance cannot be answered on the basis of present experience because all physicians who have employed such individuals were favorable to the concept. It was of interest that most physicians using physician's assistants were not particularly concerned about setting limits on their potential activities. Most felt that this would be an individual matter, though it was conceded that it was currently a legal matter as well.

Opportunities for the Graduate

Skills and Functions

The training in the development of specific skills which the Physician's Assistant Program offers its students is directed toward making them stable and productive members of the health team and thereby provide opportunities for a career and for future growth in many health-related areas.

Graduates of the program can be employed by a physician or by a group of physicians. Within the Duke University Medical Center, graduates are needed in research laboratories, clinical areas, diagnostic laboratories, and special areas such as the renal center and the hyperbaric chamber. Outside the Medical Center there are infinite opportunities for employment by community-based physicians and clinics. In any case the physician's assistants' clinical endeavors will always be under the supervision of a physician.

Employment Opportunities

The need for the physician's assistant can be measured and evaluated in many ways, but perhaps one of the most significant ways is in viewing the employment opportunities. The available positions outnumber the graduates by over five-to-one. Almost daily, requests from all over the country are received for physician's assistants; however, as with requests for physicians, many of these must go unfilled. Even though the primary objective of the program is to fulfill the needs of the first line community physician, it is easy to realize how every segment of medical practice can function more efficiently by utilizing these intermediate level professional assistants.

Salary Range

At the time of the program's inception, the question of salary range was raised. It was felt that a professional person of this caliber would command an economically attractive income which in itself would be capable of encouraging career stability. However, two related items were quickly realized — if the income of the physician's assistant was too far out of line with that of the nurse, hard feelings could possibly arise, and in order to command a respectable income, the physician's assistant would be on a schedule closely resembling that of a physician. On the basis of these and other factors it was felt that a justifiable starting salary would be in the range of ten thousand dollars a year. The ultimate income of a physician's assistant will undoubtedly be based on his actual value to his physician-employer.

Utilization and Role

In order to fulfill the desired role, a physician's assistant must be able to participate in every setting in which his physician-employer functions. There is nothing to preclude the use of physician's assistants in the hospital setting as indicated by the status of the following three issues relating to such use of trained physician's assistants.

First, existing legislation in most states is compatible with utilizing

physician's assistants in the hospital setting so long as the assistant is under the supervision of a physician and functions within the limiting legal framework.

Second, the current position of the Joint Commission on Hospital Accreditation is compatible with the use of physician's assistants in the hospital setting. So far as is known, no health related professional organization has taken any stand in opposition to this issue.

Third, in all existing situations the issue of professional liability coverage has created no difficulty for the hospital, the physician, or the physician's assistant.

A procedure has evolved for implementing the necessary steps for adequate legal and ethical support. This procedure involves both the physician and the hospital as follows:

1. The physician who employs a physician's assistant and wishes to utilize him in the hospital setting should make a formal request to the hospital director for individual limited privileges for his assistant. This document should include: (a) information on the assistant's background, character, education, and training; (b) a detailed breakdown of the proposed functions of and desired privileges for the assistant; and (c) the proposed measures of control to be utilized and the limitations to be observed.
2. The hospital director, upon receipt of his request, should first check with the hospital legal counsel to determine what changes, if any, are necessary in the hospital charter and bylaws. The request would then be handled in accordance with the existing rules of operations.
3. After approval by the necessary committees and individuals within the organization, appropriate notifications can be made.

In the judgment of the administration, every physician's assistant should be employed by and be responsible to a physician. Such an assistant can be used by more than one physician, but one physician's assistant per two physicians is felt to be maximum ratio by all who have been instrumental in the training program to date. The reasons for this are many but are based primarily on two factors — the need for identification of the physician's assistant with a physician, and the realization of the responsibility required on the part of the physician toward the physician's assistant. To be sure, many needs could be fulfilled by using this type of assistant exclusively in a hospital setting, but such a utilization must include a bond of responsibility between the physician's assistant and his physician-employer.



Academic Information

Curriculum

The educational curriculum for the training of physician's assistants covers a period of twenty-four months. Even though applicants may have taken some similar courses in their previous training they are requested to take all of the courses in the program. The reasons for this are to ensure uniformity of the graduates; because the emphasis of the content is directed toward the program goals and may, therefore, be different than other courses; and because experience has demonstrated that the courses serve as a good means for review. In those situations where an applicant seems so well qualified that nothing would be gained by participation in a course, he is given the opportunity to take the necessary examinations and upon satisfactory completion of these is allowed to omit the course. The educational program, though similar in many respects to other medically related programs, is intended to provide the necessary background for the development of a career as a physician's assistant and should not be considered as a stepping stone toward the eventual realization of a Doctor of Medicine degree.

Preclinical Curriculum

The preclinical curriculum covers an academic period of thirty-six weeks and is divided into three phases rather than two semesters. The first and third phases are each six weeks in duration and the second phase, twenty-four weeks. See the section on Courses of Instruction in this *Bulletin*.

Preclinical Schedule

<i>Course Number</i>	<i>Hours Lecture</i>	<i>Hours Laboratory</i>	<i>Total Hours</i>	<i>Credits</i>
Phase I (six weeks)				
PA 101 History, Philosophy, Ethics of Medicine	18	0	18	1
PA 103 Basic Clinical Laboratory	36	36	72	2
PA 105 Medical Terminology	18	0	18	1
PA 107* Inorganic Chemistry	18	0	18	1
PA 109* Introduction to Animal Experimentation	30	0	30	1
PA 185 Community Health	24	0	24	1
Phase II (24 weeks)				
PA 131 Clinical Microbiology	24	0	24	1
PA 133 Anatomy	48	48	96	2
PA 134 Physiology	72	0	72	2
PA 135* Chemical Biology	72	0	72	3
PA 137 Clinical Medicine	240	0	240	6
PA 139 Pharmacology	48	0	48	2
PA 141 Physical Evaluation	24	24	48	1
PA 143* Clinical Chemistry	16	32	48	2
PA 145 Diagnostic Procedures	16	32	48	2
PA 147 Animal Surgery	16	32	48	2
PA 193 Clinical Psychiatry	54	0	54	3
Phase III (six weeks)				
PA 181 Electrocardiography	24	0	24	1
PA 183 Radiology, Introduction	24	0	24	1
PA 189 Patient Evaluation	12	60	72	2
PA 187* Data Processing	18	12	30	1
Total (36 weeks)	812	244	1124	38

*See radiology curriculum.

Clinical Curriculum

The clinical curriculum of fifteen months consists of nine months (thirty-six weeks) of required rotations, and six months or twenty-four weeks of elective rotations. It is during this aspect of the training program that the student is expected to develop expertise in the application of his preclinical learning. See the section on Courses of Instruction for general course descriptions.

Clinical Schedule — Example

	<i>Duration</i>	<i>Credits</i>
Inpatient Service	2 months	6
Outpatient Service	2 months	6
Pulmonary Function	1 month	3
Administration	1 month	3
Health Clinic	1 month	3
Library Research*		1
Outside Physician	2 months	6
Elective†	2 months	6
Elective†	2 months	6
Elective†	2 months	6

*Successful completion of a library research project is required of all students.

†Electives selection in accordance with specialty training guidelines.

Clinical Specialty Training

General Medicine

	<i>Course</i>	<i>Duration</i>	<i>Credits</i>
Medical Inpatient Service	201	2 months	6 s.h.
Medical Outpatient Service	203	2 months	6 s.h.
Health Clinic	209	1 month	3 s.h.
Pulmonary Function	205	1 month	3 s.h.
Administration	207	1 month	3 s.h.
Outside Physician	213	2 months	6 s.h.
Elective		2 months	6 s.h.
Elective		2 months	6 s.h.
Elective		2 months	6 s.h.
Library Research	211		1 s.h.
		15 months	46 s.h.

General Pediatrics

Pediatric Inpatient Service	215	2 months	6 s.h.
Pediatric Outpatient Service	216	2 months	6 s.h.
Health Clinic	209	1 month	3 s.h.
Pulmonary Function	205	1 month	3 s.h.
Administration	207	1 month	3 s.h.
Outside Physician	213	2 months	6 s.h.
Elective†		2 months	6 s.h.
Elective†		2 months	6 s.h.
Elective†		2 months	6 s.h.
Library Research	211		1 s.h.
		15 months	46 s.h.

†Rotation selection from PA 511-520, 416.

General Surgery

	<i>Course</i>	<i>Duration</i>	<i>Credits</i>
Medical Inpatient Service	201	2 months	6 s.h.
General Surgery	412	2 months	6 s.h.
Surgical Outpatient Clinic-ER	233	2 months	6 s.h.
Infectious Disease	800	1 month	3 s.h.
Acute Care Unit	420	1 month	3 s.h.
Plastic Dressing Room	418	1 month	3 s.h.
Elective*		2 months	6 s.h.
Elective*		2 months	6 s.h.
Elective*		2 months	6 s.h.
Library Research	211		1 s.h.
		15 months	46 s.h.

*Elective selection from PA 312, 314, 315.

Internal Medicine

Medical Inpatient Service	201	2 months	6 s.h.
Medical Outpatient Service	203	2 months	6 s.h.
Health Clinic	209	1 month	3 s.h.
Pulmonary Function	205	1 month	3 s.h.
Administration	207	1 month	3 s.h.
Outside Physician	213	2 months	6 s.h.
Elective*		2 months	6 s.h.
Elective*		2 months	6 s.h.
Elective*		2 months	6 s.h.
Library Research	211		1 s.h.
		15 months	46 s.h.

*Elective selection from PA 311-323.

Allergy and Respiratory Disease

	<i>Course</i>	<i>Section</i>	<i>Duration</i>	<i>Credits</i>
Medical Inpatient Service	201		2 months	6 s.h.
Medical Outpatient Service	203		2 months	6 s.h.
Health Clinic	209		1 month	3 s.h.
Pulmonary Function	205		1 month	3 s.h.
Administration	207		1 month	3 s.h.
Outside Physician	213		2 months	6 s.h.
Allergy & Respiratory Dis. I	311	1	2 months	6 s.h.
Allergy & Respiratory Dis. II	311	2	2 months	6 s.h.
Allergy & Respiratory Dis. III	311	3	2 months	6 s.h.
Library Research	211			1 s.h.
			15 months	46 s.h.





Cardiology

	Course	Section	Duration	Credits
Medical Inpatient Service	201		2 months	6 s.h.
Medical Outpatient Service	203		2 months	6 s.h.
Pulmonary Function	209		1 month	3 s.h.
Health Clinic	205		1 month	3 s.h.
Administration	207		1 month	3 s.h.
Outside Physician	213		2 months	6 s.h.
Cardiology I	312	1	2 months	6 s.h.
Cardiology II	312	2	2 months	6 s.h.
Cardiology III	312	3	2 months	6 s.h.
Library Research	211			1 s.h.
			15 months	46 s.h.

Dermatology

	Course	Section	Duration	Credits
Medical Inpatient Service	201		2 months	6 s.h.
Medical Outpatient Service	203		2 months	6 s.h.
Health Clinic	205		1 month	3 s.h.
Pulmonary Function	209		1 month	3 s.h.
Health Administration	207		1 month	3 s.h.
Outside Physician	213		2 months	6 s.h.
Dermatology I	323	1	2 months	6 s.h.
Dermatology II	323	2	2 months	6 s.h.
Dermatology III	323	3	2 months	6 s.h.
Library Research	211			1 s.h.
			15 months	46 s.h.

Endocrinology

	Course	Section	Duration	Credits
Medical Inpatient Service	201		2 months	6 s.h.
Medical Outpatient Service	203		2 months	6 s.h.
Health Clinic	209		1 month	3 s.h.
Pulmonary Function	205		1 month	3 s.h.
Administration	207		1 month	3 s.h.
Outside Physician	213		2 months	6 s.h.
Endocrinology I	314	1	2 months	6 s.h.
Endocrinology II	314	2	2 months	6 s.h.
Endocrinology III	314	3	2 months	6 s.h.
Library Research	211			1 s.h.
			15 months	46 s.h.

Gastroenterology

	<i>Course</i>	<i>Section</i>	<i>Duration</i>	<i>Credits</i>
Medical Inpatient Service	201		2 months	6 s.h.
Medical Outpatient Service	203		2 months	6 s.h.
Health Clinic	209		1 month	3 s.h.
Pulmonary Function	205		1 month	3 s.h.
Administration	207		1 month	3 s.h.
Outside Physician	213		2 months	6 s.h.
Gastroenterology I	315	1	2 months	6 s.h.
Gastroenterology II	315	2	2 months	6 s.h.
Gastroenterology III	315	3	2 months	6 s.h.
Library Research	211			1 s.h.
			15 months	46 s.h.

Hematology

	<i>Course</i>	<i>Section</i>	<i>Duration</i>	<i>Credits</i>
Medical Inpatient Service	201		2 months	6 s.h.
Medical Outpatient Service	203		2 months	6 s.h.
Health Clinic	209		1 month	3 s.h.
Pulmonary Function	205		1 month	3 s.h.
Health Administration	207		1 month	3 s.h.
Outside Physician	213		2 months	6 s.h.
Hematology I	316	1	2 months	6 s.h.
Hematology II	316	2	2 months	6 s.h.
Hematology III	316	3	2 months	6 s.h.
Library Research	211			1 s.h.
			15 months	46 s.h.

Hyperbaric Medicine

	<i>Course</i>	<i>Section</i>	<i>Duration</i>	<i>Credits</i>
Medical Inpatient Service	201		2 months	6 s.h.
Medical Outpatient Service	203		2 months	6 s.h.
Health Clinic	209		1 month	3 s.h.
Pulmonary Function	205		1 month	3 s.h.
Health Administration	207		1 month	3 s.h.
Outside Physician	213		2 months	6 s.h.
Hyperbaria I	317	1	2 months	6 s.h.
Hyperbaria II	317	2	2 months	6 s.h.
Hyperbaria III	317	3	2 months	6 s.h.
Library Research	213			1 s.h.
			15 months	46 s.h.

Industrial Medicine

	<i>Course</i>	<i>Section</i>	<i>Duration</i>	<i>Credits</i>
Medical Inpatient Service	201		2 months	6 s.h.
Medical Outpatient Service	203		2 months	6 s.h.
Health Clinic	209		1 month	3 s.h.
Pulmonary Function	205		1 month	3 s.h.
Outside Physician	213		2 months	6 s.h.
Rehabilitation	419		2 months	6 s.h.
Environmental Health	701		1 month	3 s.h.
Industrial Hygiene Lab.	702		2 months	6 s.h.
Industrial Hygiene Survey	703		2 months	6 s.h.
Library Research	211			1 s.h.
			15 months	46 s.h.

Nephrology

	<i>Course</i>	<i>Section</i>	<i>Duration</i>	<i>Credits</i>
Medical Inpatient Service	201		2 months	6 s.h.
Medical Outpatient Service	203		2 months	6 s.h.
Health Clinic	209		1 month	3 s.h.
Pulmonary Function	205		1 month	3 s.h.
Administration	207		1 month	3 s.h.
Outside Physician	213		2 months	6 s.h.
Nephrology I	319	1	2 months	6 s.h.
Nephrology II	319	2	2 months	6 s.h.
Nephrology III	319	3	2 months	6 s.h.
Library Research	211			1 s.h.
			15 months	46 s.h.

Neurology

Medical Inpatient Service	201		2 months	6 s.h.
Medical Outpatient Service	203		2 months	6 s.h.
Health Clinic	209		1 month	3 s.h.
Pulmonary Function	205		1 month	3 s.h.
Administration	207		1 month	3 s.h.
Outside Physician	213		2 months	6 s.h.
Neurology I	320	1	2 months	6 s.h.
Neurology II	320	2	2 months	6 s.h.
Neurology III	320	3	2 months	6 s.h.
Library Research	211			1 s.h.
			15 months	46 s.h.

Radiology

First Year

<i>Regular</i>	<i>Course Replacement</i>	<i>Course Name</i>	<i>Hours</i>	<i>Credits</i>
PA 143	PA 160	Pharmacology & Physiology of Contrast Materials	48	1
PA 145	PA 161	Principles of Radiation Physics	48	2
PA 183	PA 162	Principles of Radiobiology	72	2
	PA 163	Basic Radiation Protection	24	1
			192	6

Second Year

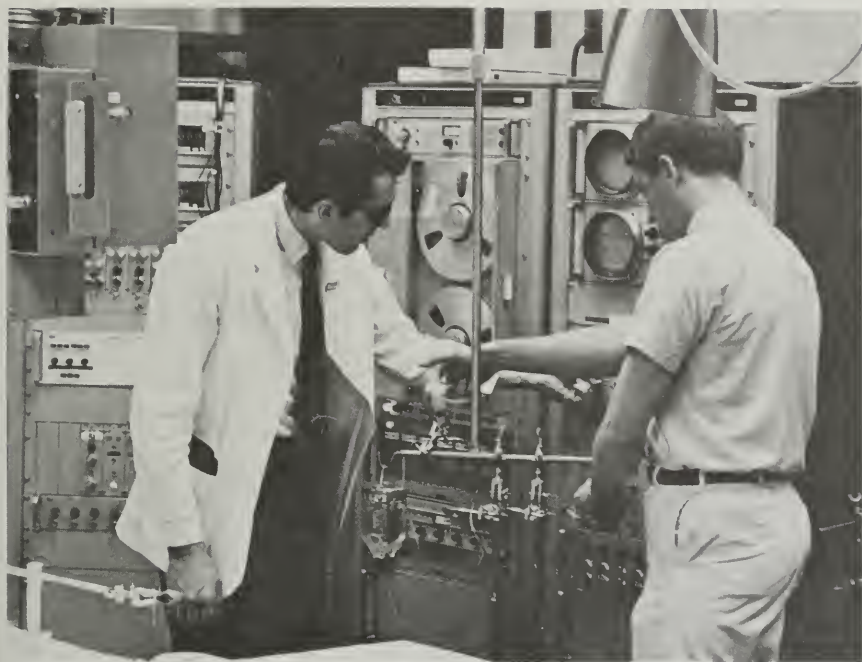
Rotations

	<i>Course</i>	<i>Section</i>	<i>Duration</i>	<i>Credits</i>
Gastrointestinal Radiology I	601		2 months	6 s.h.
Gastrointestinal Radiology II	602		3 months	9 s.h.
Uro-Radiology	603		2 months	6 s.h.
Trauma-Soft Tissue and Bone	604		1 month	3 s.h.
Chest Radiology I	605		1 month	3 s.h.
Chest Radiology II	606	1	2 months	6 s.h.
Chest Radiology III	606	2	2 months	6 s.h.
Outside Physician	607		2 months	6 s.h.
Library Research	211			1 s.h.
			15 months	46 s.h.

*See Prerequisites #5.

Neurosurgery

	<i>Course</i>	<i>Section</i>	<i>Duration</i>	<i>Credits</i>
Medical Inpatient Service	201		2 months	6 s.h.
General Surgery	412		2 months	6 s.h.
Surgical Outpatient Clinic-ER	233		2 months	6 s.h.
Acute Care Unit	420		1 month	3 s.h.
Neurology	320		2 months	6 s.h.
Endocrinology	314		2 months	6 s.h.
Orthopedics	415		2 months	6 s.h.
Neurosurgery	413		2 months	6 s.h.
Library Research	211			1 s.h.
			15 months	46 s.h.



Ophthalmology

Surgical Inpatient Service	231		2 months	6 s.h.
Surgical Outpatient Service	233		2 months	6 s.h.
Health Clinic	209		1 month	3 s.h.
Pulmonary Function	205		1 month	3 s.h.
Health Administration	207		1 month	3 s.h.
Outside Physician	213		2 months	6 s.h.
Ophthalmology I	414	1	2 months	6 s.h.
Ophthalmology II	414	2	2 months	6 s.h.
Ophthalmology III	414	3	2 months	6 s.h.
Library Research	211			1 s.h.
			15 months	46 s.h.

Orthopaedic Surgery

Medical Inpatient Service	201		2 months	6 s.h.
General Surgery	412		2 months	6 s.h.
Surgical Outpatient Clinic-ER	233		2 months	6 s.h.
Infectious Disease	800		1 month	3 s.h.
Anatomy Lab	421		1 month	3 s.h.
Rheumatology	322		1 month	3 s.h.
Neurology	320		2 months	6 s.h.
Orthopedics	415		2 months	6 s.h.
Neurosurgery	413		2 months	6 s.h.
Library Research	211			1 s.h.
			15 months	46 s.h.

Otolaryngology

General Pediatrics	511		2 months	6 s.h.
General Surgery	412		2 months	6 s.h.
Surgical Outpatient Clinic-ER	233		2 months	6 s.h.
Infectious Disease	800		1 month	3 s.h.
Plastic Dressing Room	418		1 month	3 s.h.
Pulmonary Function	205		1 month	3 s.h.
Neurology	320		2 months	6 s.h.
Neurosurgery	413		2 months	6 s.h.
Otolaryngology	416		2 months	6 s.h.
Library Research	211			1 s.h.
			15 months	46 s.h.

Plastic Surgery

Medical Inpatient Service	201	2 months	6 s.h.
General Surgery	412	2 months	6 s.h.
Surgical Outpatient Clinic-ER	233	2 months	6 s.h.
Infectious Disease	800	1 month	3 s.h.
Nephrology	319	2 months	6 s.h.
Plastic Surgery	418	2 months	6 s.h.
Otolaryngology	416	2 months	6 s.h.
Neurosurgery	413	2 months	6 s.h.
Library Research	211		1 s.h.
		15 months	46 s.h.

Urology

Medical Inpatient Service	201	2 months	6 s.h.
General Surgery	412	2 months	6 s.h.
Surgical Outpatient Clinic-ER	233	2 months	6 s.h.
Infectious Disease	800	1 month	3 s.h.
Nephrology	319	2 months	6 s.h.
Urology	417	2 months	6 s.h.
Elective*		2 months	6 s.h.
Elective*		2 months	6 s.h.
Library Research	211		1 s.h.
		15 months	46 s.h.

*Elective selection from PA-412 to 418.



Resources for Study

Libraries

The new Perkins Library, among the first seventeen university libraries in the country, contains 1,940,146 volumes and 4,000,000 manuscripts. About 80,000 volumes are added annually. Separate departmental and professional school libraries provide notable collections in the several disciplines.

More detailed information may be obtained in a *Student's Guide to the General Library*, available upon request to the Librarian of the University.

The Medical Center Library, located in the Davison Building, attempts to provide all services and collections necessary to further educational, research, and clinical activities in the medical field. Extensive reference and bibliographical services are provided. The collection exceeds 90,000 volumes, and 1,700 periodicals are received currently.

The Trent Collection on the history of medicine is an unusually fine one, rich in manuscripts and rare books, and provides an opportunity for study and research as well as casual reading in the field.

Hospitals

Duke Hospital is an integral part of the Medical Center and currently has 800 beds and 23 bassinets. The hospital performs the dual functions

of professional education and patient care. Comprehensive diagnostic and treatment facilities are provided. Different levels of patient care are provided, ranging from the intensive care units, through the conventional treatment sections to minimal care units. Private, semiprivate, and ward accommodations are available. Over 20,000 patients are admitted each year. The approximate daily census by service is as follows: Surgery, including the surgical subspecialties, 310; Medicine, 205; Pediatrics, 55; Psychiatry, 50; and Obstetrics-Gynecology, 50. Surgical facilities include 18 operating rooms where over 15,000 surgical procedures are performed annually. Four obstetrical delivery rooms are maintained. Special diagnostic and treatment units are also available, such as the recovery room, cardiac catheterization laboratory, hemodialysis laboratory, and hyperbaric oxygenation chamber.

The outpatient services are comprised of the public clinics, the private patient clinics, the employee health office, and the emergency service. Over 250,000 visits are made each year to these units. Close working relationships between Duke Hospital and other various outside health agencies enhance continued care of the patients.

The clinical faculty of the Duke University School of Medicine forms the medical staff of Duke Hospital. Thus this group not only participates in both undergraduate and graduate medical education but also in active medical practice within the hospital and the private diagnostic clinics. Duke Hospital is approved for internship and residency training by the Council on Medical Education and Hospitals of the American Medical Association and conducts an active educational program involving approximately 340 house staff members. The hospital is fully accredited by the Joint Committee on Accreditation of Hospitals.

The Durham Veterans Administration Hospital is located within walking distance of the School of Medicine. The full-time professional staff are all members of the faculty of Duke University School of Medicine. This 489-bed general hospital provides an opportunity for closely integrated student teaching and house staff training.

Administration and Registration

Admission Requirements

New students are admitted for the academic year of school beginning in the fall. Since the enrollment is limited, the Committee on Admissions selects students who, in its judgment, are best qualified to benefit from the educational advantages which the program offers. Selection is based on the academic record of the candidate, on test scores, and on satisfactory evidence of good character and general fitness. Because of the academic demands on the student during the two year training program, certain prerequisites have been established for qualification as a candidate for the program.

Prospective students are urged to broaden their reading and to make the acquaintance of a broad variety of books and magazines. At the same time they should make every opportunity to increase their competence in writing. Those who cannot write simple, clear, grammatical English prose will be progressively at a serious disadvantage in the competition for admission and also the general work of the program. Careful attention to correct English in all correspondence and on application blanks cannot be too seriously stressed for candidates for admission.

Prerequisites

1. A high school diploma or its equivalent by examination. Preference is given to candidates with two or more years of successfully completed

general college course work. All applicants should have some science courses in their academic background.

2. Previous experience in the health field with at least one year involving extensive direct patient contact.

3. Three character references and personal evaluations. These should be completed on the forms provided by the Committee on Admissions. One form should be completed by a physician with whom the applicant has worked, one by a commanding officer or supervisor, and one by an unrelated acquaintance of five years or more.

4. Completion of the Scholastic Aptitude Test and the Math Achievement Test Level I of the College Entrance Examination Board. These tests are given on the first Saturday of March, May, November, and December, and on the second Saturday of January and July. Arrangements for taking these examinations can be made through the Educational Testing Service. Applicants from the west, southwest, and all foreign countries should address their correspondence to: College Entrance Examination Board, P. O. Box 1025, Berkeley, California 94701. Applicants from the east, midwest, and south should address their correspondence to: College Entrance Examination Boards, P. O. Box 592, Princeton, New Jersey 08540. Information can also be obtained through local high schools, military education offices, and local Educational Testing Service offices in many cities. When taking the examinations the student will have to fill in the college that is to receive the test results. *Our code number is 5174. Do not fail to take that number with you when you take the examination.*

5. Applicants seeking admission to the radiology curriculum must submit evidence of the satisfactory completion of a certified, two year radiology program plus a minimum of two years experience as a registered radiological technician.

6. Candidates should allow at least three weeks for the receipt of requested information and applications must be received by the testing center one month prior to the date of the examination. Applicants should therefore begin preparation for the examinations at least two months prior to the examination date. Because final student selection begins in the spring all applicants must take their examinations no later than May of the year they wish to begin.

It should be noted that the Scholastic Aptitude Test given in the mornings consists of both verbal and math sections. The math section of the Scholastic Aptitude Test should not be confused with the Math Achievement Test Level One which is given in the afternoon. This latter test is also required.

7. Application files must be complete by April 15 (except for test results which are due in May) of the year for which admission is requested. To be considered complete they must contain the following:

- a. A completed application form with photograph.
- b. Transcript records from high school, college, military schools, and all other academic training.
- c. Three completed personal evaluation forms.
- d. Appropriate College Entrance Examination Board test results.

Application for Admission

Application forms may be obtained by writing to the Physician's Assistant Program, Committee on Admissions, P. O. Box 2914, Duke University Medical Center, Durham, North Carolina 27706.

Selection

Selections are made prior to July 1 for the students entering the following September. The data on each candidate are carefully screened by the Committee on Admissions and a personal interview will be arranged at Duke University for those with satisfactory credentials. Final notification will be made by July 1 as to whether or not an applicant has been accepted for admission. Applicants will be considered without regard to race, creed, sex, or national origin.

Registration and Orientation

Students will be registered on the first day of classes. Registration begins promptly at 8:30 a.m. Students who report at a later time will be required to pay a \$10.00 late registration fee. In no case will registration be considered after the end of the first week of classes. Orientation will immediately follow registration procedures and will last the remainder of the day. During orientation, each student is required to undergo a physical examination under the program's direction. Students whose condition needs further observation may be admitted tentatively, but must cancel their applications if findings prove them physically unable to pursue the program.

Identification Cards

On registration day each student is issued an identification card which is to be carried at all times. The card secures library privileges, health services, entry into certain athletic events, and admission to other functions entitled by special student status. A student is expected to present the card at the request of any authorized official of the University.

These cards are not transferable and their loss should be reported immediately to the Program Director's office. The cost of a new identification card is \$5.00.

Academic and Non-Academic Regulations

Academic Regulations

An over-all indication of the quality of student performance is provided by assigning quality points per semester hour of a course as follows:

<i>Grade</i>	<i>Quality Points</i>
A+	4.0
A	4.0
A—	3.7
B+	3.3
B	3.0
B—	2.7
C+	2.3
C	2.0
C—	1.7
D+	1.3
D	1.0
D—	1.0
F	0.0

The course grade is not based on examinations alone but also on the quality of the student's classroom work and written work throughout the didactic phases of the program.

A—Excellent. An *A* indicates achievement of distinction. It involves excellence in several, if not all, of the following aspects of the work — completeness and accuracy of knowledge, intelligent use of knowledge, independence of work, and originality.

B—Good. A *B* indicates general achievement superior to the acceptable standard defined as *C*. It involves excellence in some aspects of the work as indicated in the definition of an *A*.

C—Average. A *C* indicates the acceptable standard for graduation from this program. It involves such quality and quantity of work as may be fairly expected of a student of normal ability who gives to the course a reasonable amount of time, effort, and attention. Such acceptable standards should include the following factors — familiarity with the content of the course, familiarity with the methods of study of the course, full participation in the work of the course, and the ability to write about the subject in intelligible English.

D—Lowest Passing Grade. A *D* indicates work which falls below the acceptable standard defined as *C* but which is of sufficient quality and quantity to be counted in the hours of certification if balanced by superior work in other courses.

F—Failure. An *F* indicates failure that may not be made up except by repeating the course. All failures in the preclinical section must be made up before the student is eligible to participate in the clinical section.

Students with failing grades in any of the preclinical courses will be ineligible to continue in the clinical portion until the failures have been made up.

Students must have a quality point ratio of at least 2.0 before starting the clinical portion of the Physician's Assistant Program.

Grading

Final grades of performance in academic work are sent to the students at the end of each phase of the preclinical portion and after each clinical rotation while enrolled in the program. Students will be notified of any unsatisfactory performance. Progress through each phase of the program is monitored by the faculty in charge. Further evaluations are based on written and oral examinations. The student is certified as a physician's assistant upon successful completion of all preclinical and clinical material along with passing scores on the written, oral, and practical board examinations at the end of the twenty-four month period.

Incomplete Work

If because of illness or other emergency a student's work in a course is incomplete, he may receive an *I* for the course instead of a final grade.

Incomplete courses must be completed before the close of the succeeding phase; otherwise, the *I* is converted to an *F* and the course must be retaken before the student can receive any credit for it. In case a student whose work is incomplete is also absent from the final examination, an *X* is received for the course.

Class attendance regulations specifically place the responsibility for class attendance upon the individual student. A student is expected to attend his classes regularly and punctually. It should be recognized that one of the most vital aspects of a residential college experience is attendance in the classroom, and that the value of this academic experience cannot be fully measured by testing procedures alone. The members of the student body are considered sufficiently mature to appreciate the necessity of regular attendance, to self-discipline essential for such performances, and conversely, to recognize and accept the consequences of failure to attend. Instructors are privileged to refer to the Program Director for appropriate action any student who in their opinion is causing his work or that of the class to suffer because of absences or lateness.

Absences from classes due to illness will be excused when certified by a proper medical official. Absences from classes due to authorized representation of the University may be excused. Officials in charge of groups representing the University are required to submit the names of those persons to be excused to the Program Director's office forty-eight hours in advance of the hour when their absences are to commence.

Non-Academic Regulations

Accepting admission to the Physician's Assistant Program obligates the student to all Duke University regulations. The regulations, rights, and responsibilities of the student are incorporated in a student handbook issued to the students at the time of registration.

Certification

Student's progress through the course is carefully monitored by the faculty. During the clinical experience the students are evaluated by the faculty and staff in charge at the completion of their rotations. The final week of the twenty-four month program is set aside to allow the student the opportunity for demonstrating his abilities in oral, written, and practical evaluations. Upon satisfactory completion of the requirements, the student is then certified by Duke University as a physician's assistant.

Financial Information

Tuition and Fees

At the present time students of the Physician's Assistant Program are classified as Duke University Special Students and are therefore not required to pay tuition. The only required fees are the \$5.00 application fee, and a \$10.00 registration fee payable each year for participation in the Student Government Society. The application fee must accompany the application, and the other fees will be collected on the day of registration. An additional fee of \$10.00 will be charged to students who do not register at the designated time.

Student Expenses

The following table represents an estimate of a student's necessary expenses for the twelve month academic year. Allowances for clothing, travel, and other miscellaneous expenses must be added to this estimate. These of course will vary considerably depending on the needs and tastes of the individual.

Room — Single	\$ 720
Room — Married	\$1450
Board	\$ 720
Books	\$ 150

Equipment	\$ 250
Uniforms	\$ 30

Financial Assistance

The Physician's Assistant Program is approved for veterans educational benefits (G.I. Bill) for those who are eligible.

Limited funds are available for student support and are granted on the basis of needs as determined by application to the Director. Applications for assistance will be considered only after registration. Students should not anticipate financial assistance by the program as a means of support.

Employment Opportunities

Part-time employment for students is available in many areas of the Medical Center. Employment that can net the student about \$100.00 per month and yet not jeopardize his education is generally available. Students must comply with the academic schedule and are prohibited from working more than fifteen hours per week.

Employment for students' wives is available in or near the University. Typical salaries are three to five hundred dollars per month for secretaries, practical nurses, and other technically trained people; and four to seven hundred dollars per month for registered nurses, medical technologists, and other professionally trained people.



Student Life

Living Accommodations

Housing

Single students are responsible for making their own arrangements. Even though no campus housing is available, suitable quarters can be rented in areas near the Medical Center.

The University contemplates continuing its lease for 104 two- and three-bedroom apartment units for use by married graduate and professional students including married students in the Physician's Assistant Program. As compared with similar apartment properties in the Durham area, rental of the Duke-leased units provides a financial advantage to most students accepting leases through the University Department of Housing Management.

Detailed information about University housing facilities for married students, including rental rates, will be provided on request by the Department of Housing Management, Duke University, Duke Station, Durham 27706.

Dining Facilities

Several dining facilities located in and near the Medical Center are available to the students. In the Duke University Union Building there are two cafeterias offering multiple-choice menus and a dining area, the Oak Room, which offers full menus and a *la carte* items.

The Hospital offers a cafeteria service with multiple-choice menus for employees and professional students.

Student Health Services

Students are treated through the Employee Health Clinic and Faculty Health Clinic during the day and in the Emergency Room after 5:00 p.m. They have the opportunity of obtaining health coverage through the North Carolina Blue Cross & Blue Shield Association policy made available to students and employees of the University and Medical Center. Students will be given a complete physical examination at the beginning of the first year, which includes a roentgen examination of the chest and various other laboratory studies. Annual physical examinations thereafter are also required.

Organizations

There are two organizations open to students enrolled in the Physician's Assistant Program. Participation in one of these, the Student Government Society, is mandatory and costs \$10.00 per year. In the professional organization, the American Association of Physician's Assistants, participation is on a voluntary basis by both students and graduates. Fees for participation in the latter organization are \$12.00 per year to students and \$20.00 per year for graduates.

The Student Government Society officers include the president, a secretary, and class presidents and representatives from each class elected by the student body and the individual classes respectively. An executive committee, chaired by the president and composed of the secretary and the class presidents, serves as the official student voice of the Physician's Assistant Program. The responsibilities of the Student Government Society include the ability to represent student views and express opinions on various subjects to the faculty and administration; to act as a service organization for the student body responsible for student services deemed feasible by the organization and approved by the Physician's Assistant Program administrators; and to assist in the orientation of the freshman students.

A major responsibility of the Student Government Society is the preservation of the honor code which is a proud tradition of the Duke University Medical Center. The prevailing opinion has been that if a student cannot withstand the relatively minor stresses and temptations arising during his training, he can never be expected to act with integrity under the much greater demands and responsibilities he will

encounter as a physician's assistant. Thus, a strong honor system exists to develop and maintain honesty during the course of training. Each student, on or before entering the program, is required to sign a statement expressing his understanding and familiarity with the honor code and his willingness to abide by its provisions. The Student Government Society maintains an Honor Council, chaired by the president and comprised of the secretary and the class presidents and representatives to try students accused of any infringements of the honor code. The program administration serves to recommend the disposition of a student found guilty by the Honor Council.

The professional organization, incorporated in 1968 as the American Association of Physician's Assistants (AAPA), provides an active professional program with the cooperation of the students and graduates directed toward the objectives of program development, professional ethics and guidelines, and continuing education.

Motor Vehicle Registration

Each motor vehicle operated on the Duke University campuses by students must be registered within five days after operation on the campus begins, and thereafter must display the proper registration emblem.

To register a vehicle, the student must present the following documents: (1) a state vehicle registration certificate; (2) a valid driver's license, and (3) satisfactory evidence of automobile liability insurance as required by North Carolina — \$10,000 per person, \$20,000 per accident for personal injuries and \$5,000 property damage.

Parking, traffic, and safety regulations will be given each student who registers his vehicle. Students are expected to abide by these regulations.

University Regulations

Possession and Use of Alcoholic Beverages

In the State of North Carolina, it is unlawful for the persons under twenty-one years of age to purchase, possess, or use certain beverages containing alcohol. The University neither condones the illegal purchase or use of such beverages by its students nor countenances the serving of them to students under age. Moreover, it prohibits the consumption by any person or persons of these beverages on the University grounds or in its non-residential buildings. Within these limits, the University is prepared to leave to the individuals directly concerned the decision whether

or not lawfully to possess or drink the beverages in question in the residential limit. The living group remains responsible for the general tone of each area of residence, however, and may by majority vote adopt house regulations more limiting than the laws of the State.

The attention of all students is called to sections of the General Statutes of North Carolina (see Appendix A).

Possession and Use of Certain Drugs

Duke University prohibits its members to possess, use, or distribute illegal drugs, including opiates, barbiturates, amphetamines, marijuana, and hallucinogens, except for legally authorized medical purposes and scientific research. Both federal and North Carolina laws forbid unauthorized possession and distribution of drugs of the classes specified. In addition, the presence and use of many of these drugs within the University community are contrary to the intellectual and educational purposes for which the University exists.

The University recognizes that ignorance or innocence concerning such drugs threatens the safety of members of its community. It therefore seeks to provide as much information as it can concerning consequences of harmful drugs. The University recognizes also that the illicit use of drugs may reflect emotional problems and is prepared to assist its members involved in their use through medical and psychiatric counseling. Nevertheless, the University considers a violation of the drug prohibition a serious matter and reserves the right to take action appropriate to the circumstances of each case.

Action taken by the University in all cases of drug violation will be guided by a concern both for the emotional and physical welfare of the person involved and for the maintenance of a suitable educational environment for all members of the University.

Rules. Alleged violations of the policy stated in paragraph 1 above will be adjudicated by the appropriate deans, or in the case of non-students, by comparable authorities, and their appointed delegates. It is expected that deans' staffs will exercise professional judgment in referring indicated cases to University health and counseling services, in keeping with paragraphs 2 and 3 of the policy stated above.

The two grounds which may constitute occasion for the assessment of penalties are:

- a. Conviction of a member of the University on a drug charge by a court of law.
- b. A finding by the appropriate University Tribunal, in conformity with the principle of due process, of sufficient evidence that a member of the University has violated the drug policy.

The maximum penalty to be imposed within the University upon a student for the possession or use of marijuana shall be suspension; for the possession or use of other illegal drugs, or the distribution of any

illegal drug, the maximum penalty of the University is expulsion. Other members of the University shall be liable to appropriate comparable penalties.

See section B and C of the Appendix for federal and state statutes pertaining to the possession and use of certain drugs.

Nondiscrimination and Off Campus Facilities

As University policy prohibits discrimination in any way on the basis of race, creed, or national origin, it is required that University personnel and campus organizations govern themselves accordingly. This covers the official activities sponsored, financed, and controlled by these groups whether the activities are held on or off campus. If they are held off campus, the use of facilities where discrimination is practiced is prohibited. Individual students, faculty members, or private groups are free, of course, to conduct their personal affairs as they see fit.

Pickets and Protests

Disruptive picketing, protesting, or demonstrating on Duke University property or at any place in use for an authorized University purpose is prohibited.



Courses of Instruction

Preclinical Courses

PA 101. *History, Philosophy, and Ethics of Medicine.* An eighteen hour lecture course designed to provide knowledge and understanding of current ethical standards by means of historical development and the orientation of these ethical standards into the current framework of the health team structure provides students with the ability to observe and apply these standards in the various settings and relationships in which they function. In addition, emphasis is placed on an historical overview of significant medical facts in the development and use of non-physician members of the medical team. The remaining portion is delegated to analysis and application of medical and paramedical roles toward the fulfillment of current and future medical needs of society. 1 s.h. *Howard*

PA 103. *Basic Clinical Laboratory.* A seventy-two hour lecture-laboratory course designed to introduce the use of laboratory equipment and the obtaining and processing of various specimens. Each student develops the capability of accurately performing numerous fundamental laboratory procedures including a complete blood count, urinalysis, and Gram stain. The interpretation and usefulness of laboratory data in physical diagnosis and treatment is stressed. In addition, during the laboratory portion, students develop a proficiency with such procedures as collecting needed chemistry samples. 2 s.h. *McQueary*

PA 105. *Medical Terminology*. An eighteen hour lecture course that (1) formulates a working knowledge of medical etymology through the study of Greek and Latin word roots and the evaluation and correction of medical records and other forms; (2) develops an early understanding of the accepted methods for recording significant historical, physical, and clinical data; and (3) emphasizes the necessity of proper spelling, correct punctuation, and legible penmanship. 1 s.h. *Kernodle*

PA 107. *Inorganic Chemistry*. An eighteen hour lecture course which teaches the student fundamental concepts, measurements and problem-solving, matter and its classification, periodic classification of the elements, chemical bonds, writing chemical formulas, empirical and molecular formulas, equations and mass relationships, the gas laws, the mole and volume relationships of gases, solutions, particles, acids and bases, pH and salts, standard solution and titration, and chemical equilibrium. This accomplishes a fundamental systematic study of the nature of matter and its properties, combining theoretical and applied chemistry. 1 s.h. *Spooner*

PA 109. *Introduction to Animal Experimentation*. A thirty-hour lecture course that presents (1) the extrinsic and intrinsic causes of disease due to a nutritional excess or deficiency; (2) the zoonotic management of disease transmission to man and the necessity for food hygiene; (3) the transmission of disease and the basics of epidemiology; (4) the common and specific diseases transmitted from animal to man to include rabies, leptospirosis, salmonellosis, brucellosis, and the mycoses; and (5) the selection and handling of various experimental animals. 1 s.h. *Vakilzadeh*

PA 131. *Bacteriology*. A twenty-four hour course designed as an introduction into the clinical applications of bacteriology and microbiology. A study is made of the common bacteria, fungi, and viruses that cause disease in man. The student becomes acquainted with the proper methods of specimen collection, handling, and identification and the methods and procedures employed in bacteriological laboratories. The instruction is designed to give the student a clear concept of: (1) how organisms gain entrance to the body; (2) the types of toxins which they produce; (3) the nature of the immune bodies which are produced by the host; and (4) the methods of preventing the disease by active and passive immunization. 1 s.h. *Osterhout*

PA 133. *Anatomy*. The core course in anatomy constitutes ninety-six hours during a twenty-four week period in Phase II. The gross anatomy of the head, neck, trunk, back, pectoral and pelvic girdles, and the limbs as well as the interior of the cranium, including the gross anatomy of the ear, orbit, oral and nasal passages, paranasal sinuses, and, finally, neuroanatomy is presented. Instruction is designed to be as informal and as nearly individual as possible. General principles and the functional viewpoint of living anatomy are stressed in the hope that the

student may be stimulated to secure a working knowledge of anatomy in the broadest sense. Patients exemplifying anatomical principles are presented, some within the classroom, others over live television or videotape at the appropriate time in the students' learning process. All of the above is integrated with the physiology, patho-physiology, and clinical medicine taught during Phase II. 2 s.h. *Anatomy Staff*

PA 134. *Physiology*. The core course in physiology consists of seventy-two hours of lectures over a twenty-four week period in the second phase. The course includes the following topics: (1) theory of diffusion of metabolizing systems; (2) osmotic equilibrium and transport processes; (3) cellular basis of activity in skeletal, cardiac, and smooth muscle; (4) ionic properties of muscle membranes; (5) molecular basis of contraction; (6) cardiac electrophysiology; (7) development of cardiac action potentials; (8) processing and exchange of gases with the atmosphere, transport of carbon dioxide and oxygen, and exchanges of gases in the pulmonary and systemic capillaries; (9) mechanism of action of hormones, their effect on cell membrane permeability, enzyme systems activity, growth regulation, osmoregulation, and reproduction; (10) neurophysiology to include neurone synaptic interrelationships and transmitter substances. Instruction is on a formal basis with no laboratory experience. This course is integrated with the anatomy, pathology, and clinical medicine courses during Phase II. 2 s.h. *Physiology Staff*

PA 135. *Essentials of Chemical Biology*. A twenty-four week seventy-two hour lecture presentation of the fundamentals of inorganic, organic, and biological chemistry through lectures, laboratory exercises, and demonstrations. The course is outlined to focus attention on the basic theories and laws of chemistry and physics as applied to the structures and function of living cells, tissues, organic systems, and the whole organism, particularly man. Students become acquainted with more frequently used medical laboratory equipment, chemicals, techniques, and the mathematical calculations used in handling chemical problems. Students perform those qualitative procedures essential for understanding basic concepts of these two areas of chemistry as they apply to physiological mechanisms and processes. An introduction to metabolic processes is considered by a study of the environment and nutrition of man, respiration and energy requirements, and the mechanisms necessary for regulating and maintaining homeostasis. Consideration is also given to the pathological interruption of these control mechanisms. 3 s.h. *Spooner*

PA 137. *Introduction to Clinical Medicine*. A twenty-four week, 240 hour course providing the basic direction for the core curriculum of Phase II. Its purpose is to acquaint students with the common pathologic and psychosomatic disorders seen in clinical medicine. Lectures are given by physicians, nurses, dieticians, physical therapists, and specialists in other related disciplines, for the purpose of developing techniques of planning total patient care based on the knowledge and understanding

of a disease's etiology, pathology, signs and symptoms, clinical course, complications, prognosis and prophylaxis as well as the personal circumstances surrounding the patient. Each student is exposed to the patient, his family, and the ward staff. He follows the patient's course for several days, and then develops a written and oral presentation in accordance with hospital guidelines, presenting the patient to the class, at which time he directs the class discussion concerning the prognosis, therapeutic plan, and future therapy. 6 s.h. *Staff*

PA 139. *Pharmacology*. A forty-eight hour lecture course taught during the core phase that: (1) introduces the student to the scope of pharmacology and its relation to other sciences; (2) develops an analytical approach to drugs, i.e., indications for actions, side effects, precautions, contraindications, usual dosage, toxic effects, and related treatment; and (3) teaches the student to evaluate each drug with the patient in mind. Drugs are presented according to their reactions and correlated with the diseases concurrently being studied in the clinical medicine course. Consequently, drug therapy is covered regarding common diseases seen in the following systems: skeletal, skin, cardiovascular, respiratory, renal, endocrine, neurology, and eye, ear, nose, and throat. 2 s.h. *Staff*

PA 143. *Clinical Chemistry*. The purpose of this course is to familiarize the student with the equipment, reagents, values, and implications of numerous clinical testings. The students are given the methods to develop an understanding of blood banking, immunohematology, hepatic metabolism, enzymes in cardiology, gastroenterologic studies, and rheumatoid studies. The student becomes knowledgeable in the performance of ABO and RH typing; PSP, BSP, and creatinine clearance testing; blood urea nitrogen and electrolytes; sulkowitch testing; sedimentation rates, lupus preps, schilling tests, and histalog testing. This exposure helps develop a knowledge of normal and abnormal test values and the ability to assist those that may be doing them on an emergency basis. 2 s.h. *Staff*

PA 145. *Diagnostic Procedures*. Provides the student with the fundamentals of the more unusual and detailed laboratory and clinical procedures including applied sterile technique, basic physical therapy exercise, demonstration of cast application and splinting, cutdowns, spinal taps, thoracentes, paracenteses, tracheotomies, nasogastric intubation, gastric analysis with histalog, bone marrow taps, gastroscopy, sigmoidoscopy and proctoscopy, skin testing, glucose, insulin, and orinase tolerance testing; catheterization, visual fields and acuity, and audiometry. The time is divided between lecture and demonstration with laboratory and bedside participation by the student. Each lecture demonstration and participation phase is conducted by a specialist in that area being studied. To achieve the most complete effect from each topic or procedure presented, each is correlated with practical experience. 2 s.h. *McQueary*

PA 147. *Animal Surgery*. An eight-week laboratory course allowing students to apply the knowledge of aseptic and surgical technique, as well as the preparation of the operative site and draping of the sterile field. Students accomplish this through the performance of minor and major procedures to include pre- and post-surgical management of experimental animals for the purpose of developing a knowledge of the systems' behavior to surgery and infection. The necessity of correlating laboratory data with patient behavior is also presented. 2 s.h. *Simpson and Staff*

PA 160. *Pharmacology and Physiology of Contrast Materials*. A detailed twenty-four hour study of commonly used radiologic contrast media. Emphasis is placed on chemical ingredients, excretion rates by body systems, patient preparation, dosage calculation and administration and the recognition and initial management of hypersensitivity and chemotoxicity of various contrast media. In addition, the student is exposed to the individual actions of the various radiological compounds as they pertain to specific radiological procedures. 1 s.h. *Thompson*

PA 161. *Radiation Physics*. Presentation of the history, fundamental concepts and production and nature of roentgen rays. Emphasis is on modern X-ray tubes; generators; video tape recorders; and video systems including orthicon, vidicon, plumbicon, and cine. An in-depth experience is provided with the mechanisms and mechanics of an X-ray department. 2 s.h. *Thompson*

PA 162. *Radiobiology*. An introduction to energy transfer from radioactive materials to living tissue and basic cellular reactions to irradiation. The genetic and medical hazards of ionizing radiation to man, its relative biological effectiveness and latent biological reactions are stressed. Emphasis is also placed on the sources of natural radiation, dosimetry, dosage calculation of radiopharmaceuticals, and patient preparation and precaution. 2 s.h. *Thompson*

PA 163. *Radiation Protection*. A course designed to present a broad knowledge of irradiation. Emphasis is placed on nuclear science and radiographic terminology, natural radiation, radiation dosimetry and detection, maximum permissible radiation levels and dosages, protective shielding and its design, care of radiation workers and personal protection. 1 s.h. *Thompson*

PA 181. *Fundamentals of Electrocardiography*. Is designed to teach the student the principles of electrocardiography and use of the necessary equipment and to develop the student's ability to detect and diagnose abnormalities in the twelve lead electrocardiogram, and to recognize cardiac arrhythmia from a rhythm strip and/or on a monitoring cardiac oscilloscope. Through the use of audiovisual aids, slides, EKG tracings, bedside monitor readings, cardiac pacemaker units, and practical experience in the resuscitation of induced cardiac arrest in animals, the

student develops the ability to rapidly detect (via early warning signs with a complementary clinical picture) impending cardiac difficulty with the emphasis on precaution against complications. 1 s.h. *Staff*

PA 183. *Introduction to Radiology*. Introduces the student to modern radiology and its many procedures as they pertain to the diagnosis and treatment of certain illnesses. Students are exposed to various radiologic diagnostic techniques including procedural indications, patient preparation, procedural accomplishment, interpretation, limitations, and possible side effects. Simultaneously the student receives an in-depth exposure to the radiologic interpretation of roentgen examinations of the chest. 1 s.h. *Thompson*

PA 185. *Community Health*. Twenty-four hours of seminars, discussions, and field trips to the community health organizations to acquaint students with local, state, and federal health agencies for the purpose of developing a sociological appreciation of community living, public health education for disease detection and prevention, and financial aid available to the community population for the acquisition of health care. 1 s.h. *Staff*

PA 187. *Basic Principles of Data Processing*. An introduction for the student with no previous exposure to the field of data processing. It presents the impact and future involvement of computers and data processing in medicine. Exposure to various hardware (computers and auxiliary machines) facilitates his learning the fundamentals of digital computers, the basic mathematical and numerical systems needed to utilize the computer, and the principles of flow charting and programming so as to enable students to develop simple programs at the completion of the course. 1 s.h. *Smith*

PA 189. *Patient Evaluation*. For the student with a background in anatomy, physiology, and pathology, the course provides an understanding of the historical development of a disease process through the proper methods and techniques of eliciting a patient history and accomplishing a physical examination. The relationship of patient historical and physical data is presented by repeated exposure to in-hospital patients upon whom a complete history and physical examination is accomplished with the completed work-up presented and evaluated by the physician in charge. 2 s.h. *McFarland*

PA 193. *Growth and Development*. Introduces the student to current theories of knowledge, particularly as they relate to the special complex problems of empirical meaning, objectivity, measurement, and the mind-body problem. Changes in personality due to biologic maturation and the influence of life roles are presented with emphasis on early childhood development, adolescence, and adulthood. The lecture material is correlated with the development of patient interview techniques, integrating both psychodynamic techniques and psychophysiological methods for handling psychosomatic diagnostic problems. 1 s.h. *Short*

Clinical Courses

Required Clinical Rotations

Students participating in medicine, surgery, pediatrics, and their subspecialties must take *one* inpatient and *one* outpatient rotation plus all other rotations listed in this group. Those students participating in radiology, pathology, or industrial medicine are required to take the courses outlined in the section on curriculum.

PA 201. *Medical Inpatient Service.* During this two month rotation, the student is expected to attend all work rounds, teaching rounds, noon conferences, and grand rounds of the Medical Service. He is responsible for taking complete medical histories and complete physical examinations on incoming patients; recording progress notes and performing inpatient diagnostic and evaluation procedures including: (1) lumbar puncture, (2) drawing pertinent blood samples, (3) insertion of venous intracatheter, (4) patient catheterization, (5) nasogastric intubation, and (6) intravenous medication and infusion. The scheduling of technical diagnostic and management procedures and performance of discharge physical examination with dictation of narrative summary for chart completion is accomplished by the student. All examinations and procedures performed and scheduled are subject to the ward resident's approval. 6 s.h. *Chief Medical Resident*

PA 231. *Surgical Inpatient Service.* During this two month rotation the student receives exposure to a wide variety of surgical problems. He attends all rounds and conferences required by the service. He must evaluate surgical patients by appropriate history and physical examination techniques and perform routine pre- and postoperative laboratory studies, suture removal, postoperative respiratory therapy, removal of cavity drains, intravenous medication and infusion, and pre- and postoperative patient care. He becomes knowledgeable of general surgical disease and the application and limitation of postoperative rehabilitation by following patients from admission to discharge. 6 s.h. *Surgical Resident*

PA 203. *Medical Outpatient Service and Emergency Room.* The student is responsible for the accomplishment of routine histories and physical examinations on both new and return patients to the medical clinic. He develops impressions of the patient's condition, suggests diagnostic tests, and directs the patient's therapy under the auspices and supervision of the medical resident assigned. The student becomes acquainted with emergency procedures and has the opportunity to discuss and understand the necessity for these procedures by association with the resident-in-charge. He is exposed to the emergency procedures required in status epilepticus, status asthmaticus, cardiac arrest, respiratory failure, and acute traumatic shock. The students are required to learn and understand the functions of equipment present in the emergency room. In

addition, the students are exposed to and develop a knowledge of patient triage in multiple emergency situations. 6 s.h. *Lessen*

PA 233. *Surgical Outpatient Clinic and Emergency Room.* A two month rotation which exposes the student to a broad spectrum of surgical pathology, from both a clinical and emergency standpoint. The student assists the surgical staff by taking histories and completing physical examinations on clinic patients and initiating emergency care relating to patient triage. He undergoes exposure to the emergency procedures required in acute trauma and emergent surgical illness. He is required to learn and understand the type of equipment present in the emergency room, including an understanding of the procedures involved in venous cutdown, intravenous infusions, nasogastric intubation, lumbar puncture, paracentesis, thoracentesis, and tracheotomy. In addition, the student is exposed to and develops the ability to triage in multiple surgical emergencies. 6 s.h. *Mauney*

PA 205. *Pulmonary Function/Inhalation Therapy.* A one-month rotation which exposes the student to pulmonary disease and allows him to develop and display competence in the area of pulmonary functions and the procedures used in inhalation therapy, so that he may develop an understanding of the limitations and importance of these procedures. The students make rounds and attend all conferences required by the department. He participates in pulmonary function studies and in the follow-up of these studies by doing laboratory procedures associated with the studies. The student is expect to see patients, take histories and do physical examinations (with special emphasis on problems concerning patients with chronic respiratory disease), and to follow the patient through daily rounds; recording progress notes, throughout the entire rotation. In addition, the student becomes proficient at drawing venous and arterial blood samples and in performing blood gas evaluation on arterial samples. 3 s.h. *Ramirez-Rivera*

PA 207. *Health Administration.* A one month rotation divided into two sections: one of one-week duration and the other of three-weeks duration. The segment of three-weeks duration is spent with various state agencies. This includes one week in the agency offices to develop an understanding of their services (to whom they are available, the techniques of engaging those eligible into the system, and the administration and resources necessary for the delivery of these services to the population). The remaining two weeks of the three-week segment takes the student into the field for the purpose of observation and participation in the actual carrying out of the agencies' operations. The last week is used to investigate the application of health insurance through various types of insurance organizations. 3 s.h. *Howard*

PA 209. *Faculty Health Clinic.* A one month rotation for the purpose of exposing the student to the operation of a private patient health clinic which is operated by the Department of Community Health Sci-

ences. The students further develop and apply the knowledge and skills of patient evaluation under the direction of a physician. Patient workups are presented to the physician for evaluation and final patient disposition. In addition, the students are exposed to and participate in the use of pre-planned questionnaires for the purpose of converting the data to computer language. This data is developed further for use in a computerized approach for initial patient screening. 3 s.h. *McFarland*

PA 210. *Employee Health Clinic.* A one month rotation exposing the student to an employee health clinic population, functioning under the direction of the Department of Community Health Sciences. He further develops and applies the knowledge and skills of patient evaluation under the direct supervision of a physician. The student is exposed to a broad spectrum of occupational disease and injury and participates in the triage of injuries and the screening and referral of ill employees. 3 s.h. *Staff*

PA 211. *Library Research.* A library experience where the student is required to readily familiarize himself with the amassed medical knowledge and its locations and methods of access to it in the medical library. The student compiles historical, statistical, and medical research for a previously selected and approved topic. The data are scrutinized, selected, compiled, and finally developed into a paper for future seminar presentation. The rough-draft paper undergoes screening for sentence structure, grammar, and composition prior to being sent to physicians whose interest is specific to the area. The topic is then further reviewed prior to final preparation for seminar presentation. 1 s.h. *Staff*

PA 213. *Outside Physician.* A two-month clerkship that exposes the student to all the aspects of the practice of medicine, to include administration, in a community setting. In the hospital setting, the student rounds with the attending physician taking and recording notes, accomplishing and recording medical histories and physical examinations, and completing discharge summaries. He is responsible for initial and return patient visits after explaining the relationship in the clinic setting. In the performance of those duties outlined, the assistant, through the use of his education, knowledge, and time, aids in a more efficient and beneficial practice of medicine and has the opportunity to do those tasks for which he is trained while the physician can evaluate the advantages of using a well-trained assistant in his practice. 6 s.h. *Clinical Staff*

PA 215. *Pediatric Inpatient Service.* A two-month rotation developing an awareness and understanding of the spectrum of medical and surgical disease and its management on an inpatient basis. Through historical review, physical examination, and participation in patient management, the student becomes familiar with the variable therapeutic regimens and dispositions for the pediatric inpatient. He is responsible

for recording progress notes, drawing blood samples, nasogastric intubation, catheterization, insertion of intravenous catheters and infusion of intravenous medication, routine urinalysis, and complete blood count 6 s.h. *Pounds and Staff*

PA 216. *Pediatric Outpatient Service/Emergency Room.* A two-month rotation exposing the students to a broad spectrum of disease and its management for both clinic and emergent patient populations. The student accomplishes third person histories and physical examination on new and return outpatient clinic patients. The formulation of an impression, suggestion of diagnostic procedures and the direction of patient therapy are accomplished under the auspices and direction of the pediatrician assigned for the purpose of becoming acquainted with the numerous patient disposition of both clinic and emergency patients. 6 s.h. *Pounds and Staff*

Elective Clinical Rotations

During the preclinical year, detailed accounts of the content of each rotation are made available to the students. After counseling with the students, schedules for clinical experience are developed.

Medical Elective Rotations

PA 311. *Allergy and Respiratory Disease.* A two-month rotation that provides an in-depth exposure to patients with respiratory and allergic conditions through evaluation by special history and physical examination techniques, diagnostic and therapeutic management procedures that include allergy skin testing and eosinophilic nasal smear counts. The student participates in daily rounds and teaching conferences on respiratory disease and gains a knowledge of the therapeutic regimens, the indications, availability, reliability, and limitations in the treatment of respiratory and allergic disease. 6 s.h. *Sieker*

PA 312. *Cardiology.* A two-month rotation during which the student is taught the indications, limitations, and methods of accomplishing the necessary cardiologic diagnostic procedures and therapeutic regimen for the evaluation of these disorders. He attends all daily rounds and conferences, as indicated by the physician-in-charge, while on the cardiology service. Students evaluate patients by initial history and physical examination, performing certain diagnostic and therapeutic studies including the performance and interpretation of electrocardiograms and phonocardiograms. They follow patients from admission to discharge providing care and analysis of the hypertensive and infarct patient, recording progress notes, discharge physical examinations, and narrative summaries under the guidance of the physician-in-charge. 6 s.h. *Ruski*

PA 313. *Cardiovascular Laboratory.* A two-month rotation during

high the student attends all required daily rounds and conferences. He taught the indications, limitations, and methods of cardiac catheterizations and other cardiovascular diagnostic studies. He becomes acquainted with the electronic and laboratory equipment and is able to utilize this equipment with competence and skill. The student participates in the catheterizations of patients, performs cardiac catheterizations on laboratory animals, and does complete work-ups on clinic patients to develop a knowledge of the cardiac disease spectrum and the diagnostic role that cardiac catheterization plays. He participates in the management of cardiac patients in the postoperative state and provides treatment of procedural complications. Students are permitted to follow patients from admission to discharge in order to become acquainted with the variable dispositions for cardiovascular catheterization patients. 6

s. Morris

PA 314. *Endocrinology*. A two-month rotation designed to expose the student to endocrinological disease with the emphasis placed on the diagnosis and treatment of these diseases. Students attend all daily rounds and conferences while on the service. They are taught the indications, limitations, and methods of performing certain diagnostic procedures to include: glucose; insulin and tolbutamide tolerance testing; thyroid function studies, and nasogastric intubation for gastric analysis. The students evaluate and care for the endocrinologic patient by history, physical examination and narrative summary under physician supervision. 6 s.h. Lebovitz

PA 315. *Gastroenterology*. A two-month rotation designed to provide the student with an in-depth exposure to gastroenterology with emphasis on diagnosis and treatment of gastroenterologic conditions. Each student attends all conferences and daily rounds as required by the service. He becomes knowledgeable in history taking, physical examination, and diagnostic and management procedures. The student participates in patient care and takes progress notes on assigned patients. A proficiency at nasogastric intubation and gastric analysis; both with and without fluoroscopy, secretin tests, rectal and small bowel biopsy, proctoscopy, sigmoidoscopy, and gastroscopy is developed. A proficiency for care of endoscopic instruments, biopsy instruments, and biopsy specimens is acquired. In addition, the student follows patients from admission to discharge with completion of the discharge physical examination and narrative summary subject to physician approval. 6 s.h. Tyor

PA 316. *Hematology*. A two-month rotation designed to acquaint the student with the broad spectrum of hematologic disorders. The student is required to attend all daily rounds and conferences while on the hematology service. Through patient evaluation by special history and physical examination criteria, he learns the indications, limitations, and methods of performing the necessary diagnostic procedures and therapeutic measures for treating these disorders. These procedures include a thorough understanding of the performance and screening of routine

blood work, blood culture, bone marrow biopsy, and electrophoresis. In addition, skills in paracentesis, thoracentesis, blood transfusion and blood banking and the intravenous infusion of chemotherapeutic agents are developed. Scheduling procedures in X-ray and nuclear medicine, collecting data from laboratories, finding X-rays and tracing reports, organizing ward charts and techniques in expediting patient studies are also required during this rotation. 6 s.h. *Silberman*

PA 317. *Hyperbaric Medicine*. A two-month rotation providing the student with the opportunity of developing techniques for the accomplishment of detailed patient work-ups specifically related to patients requiring the services of the hyperbaric chamber. He learns the indications, limitations, and scope of services provided and develops an understanding of the principles of hyperbaria. The student receives the necessary opportunities to develop competence and skill in the proper use of the hyperbaric chamber. He also evaluates and records the progress of patients under and/or following hyperbaria including pre- and post-treatment rounds. 6 s.h. *Saltzman*

PA 319. *Nephrology*. A two-month rotation exposing the student to nephrologic disorders with emphasis on diagnosis and treatment of chronic renal disease. Each student is required to attend all daily rounds and conferences. He develops an insight into the indications, limitations, and methods of accomplishing renal biopsies. The student receives exposure to a broad spectrum of acute and chronic renal disease by patient evaluation through history and physical examination, daily progress notes and evaluation of routine problems of a nephrology service, and follow-up on rehabilitation of nephrologic patients, with emphasis on determining guidelines for renal dialysis. 6 s.h. *Robinson*

PA 320. *Neurology*. A two-month rotation that provides the student with an in-depth exposure to neurological conditions through the patient and outpatient care and evaluation of patients by appropriate history and physical techniques during examination. The student performs certain diagnostic and therapeutic procedures including lumbar punctures, tolerance testing, intravenous infusion of medication as well as complete blood counts, spinal fluid analyses, and blood cultures. Scheduling procedures in X-ray, nuclear medicine, and EEG, lab, collecting data from laboratories, finding X-rays and tracing reports, organizing ward charts, and techniques in expediting patient studies is required during training. The student develops an understanding of miscellaneous neurologic procedures, including electroencephalography, brain scan, pneumoencephalography, and central nervous system radiologic studies. The performance of discharge physical examinations and narrative summaries to ensure chart completion are carried out as directed. The student attends all daily private, public, teaching rounds, and conferences. 6 s.h. *Appel*

PA 321. *Psychosomatic Medicine*. A two-month rotation exposing

the student to conditions with a primary psychosomatic ideology. Each student becomes acquainted with the broad spectrum of psychosomatic disorders and develops an understanding of the indications, limitations, and scope of diagnostic procedures for the psychosomatic patient. The student formulates techniques for patient evaluation and becomes knowledgeable of the therapeutic regimens, their indications, availability, reliability and limitations in the treatment of psychosomatic disorders. The above being accomplished through lectures and clinical experience. The student also follows the patients from admission to discharge and becomes acquainted with the various possible dispositions for the patient. Each student is required to attend all specified rounds and conferences. 6 s.h. *Reckless*

PA 322. *Rheumatology*. A two-month rotation that provides the student with an in-depth exposure to rheumatology for the purposes of: (1) developing techniques specifically related to rheumatology in accomplishing a detailed patient work-up and (2) providing the student with the necessary samples and equipment to develop competence and skill in accomplishing the diagnostic procedures required for the complete and accurate evaluation of the rheumatologic patient. The service exposes the student to the therapeutic regimens, their indications, availability, reliability, and limitations in the treatment of rheumatologic diseases. He is required to follow patients from admission to discharge to become acquainted with their possible and variable dispositions. The student attends daily rounds and teaching conferences as designated by the service. 6 s.h. *Kerby*

PA 323. *Dermatology*. A two-month rotation exposing the student to a broad spectrum of dermatologic disease from both an inpatient and outpatient standpoint. The student takes histories and performs physical examination, with special emphasis on problems concerning the patient with dermatologic disease. The performance of KOH preps, skin biopsies, and tissue scrapings is carried out by the student on prescribed patients. The student thus becomes familiar with the therapeutic regimens, their indications, availability, reliability, and limitations in the treatment of dermatologic disease. In addition, he follows patients from admission to discharge, and becomes acquainted with the various possible dispositions for the dermatologic patient and attends all daily rounds and conferences required by the service. 6 s.h. *Tindall*

Surgical Elective Rotations

PA 412. *General Surgery*. A two-month rotation designed to expose the student to a wide variety of surgical problems. Each student is provided the opportunity to gain facility in patient care through the management of patients. The student is expected to use his initiative under supervision in carrying out preoperative and postoperative care of the patient through history taking, physical examination, emergency

room and operating room exposure, and classroom learning in order to facilitate patient recovery. The student is required to attend all rounds and teaching conferences as designated. 6 s.h. *Mauney*

PA 413. *Neurosurgery*. A rotation designed to expose the student to the spectrum of neurological disease and methods of neurosurgical intervention. The student takes histories and performs physical examinations, participates in pre- and postoperative care, performs numerous routine laboratory studies, participates in the operating room, and assists with the special procedures as needed. The care of neurosurgical instruments and photographic and electronic equipment is required. Participation in stereotactic research studies is also required of the student. In addition, he attends all rounds and teaching conferences. Prerequisite: PA 320. 6 s.h. *Nashold*

PA 414. *Ophthalmology*. A two-month rotation to expose the student to a wide spectrum of ophthalmologic diseases. Through lecture, teaching rounds, and performance of special history and physical examination techniques, the student becomes proficient at determining visual fields, visual acuity, oculotonometry, and optical prescriptions. He becomes knowledgeable in the basic principles of refraction and the numerous medical and surgical therapeutic regimens available for the treatment of ophthalmologic disorders. In addition, the student participates in the routine care of ophthalmologic inpatients and outpatients. 6 s.h. *Anderson*

PA 415. *Orthopaedic Surgery*. A two-month rotation in which the ultimate goal for the student is to obtain the highest degree of knowledge and skill in caring for the many problems of the orthopedic patient, which is accomplished through adequate historical review and physical examination, delivery of emergency care to patients suffering from acute trauma, pre- and postoperative care of the surgical patient as desired by the attending physician, and the ability to maintain good sterile technique and operating room technique. He develops an understanding of the pathophysiology and the complications of bone and joint injury as well as the ability to fabricate and apply a variety of splints, traction, and casts. 6 s.h. *Goldner*

PA 416. *Otolaryngology*. A two-month clinical exposure to acquaint the student with a broad spectrum of ENT disease. The student becomes proficient in the recognition of emergency problems and initiates the first steps in the management of such problems. Evaluation of the ENT patient by history and physical examination, seeing the follow-up patient, following the course of the disease process, and evaluating the response to treatment for the physician is required of the student. The student learns and performs tracheostomy care, assists with the management of the pre- and postoperative patients, participates in the operating room, assists with special operating room procedures, and performs special audiometric techniques and testing. 6 s.h. *Hudson*

PA 417. *Urology*. A two-month rotation that exposes the student to the broad spectrum of urologic disease through the performance of a history and physical examination on clinic and hospital patients. He participates in all clinical rounds and teaching conferences to develop an understanding of the therapeutic regimens, their indications, availability, reliability, and limitations in the treatment of urologic disorders. The student develops an understanding of the applications of urologic disorders and the indications for catheterization, cystoscopy, renal function studies, intravenous pyelograms, retrograde pyelograms, and urine chemical evaluations. He participates in the pre- and postoperative care of the urologic patient and the performance of discharge physical examinations and the writing of narrative summaries on patients assigned. 6 s.h. *Glenn*

PA 418. *Plastic Surgery*. A two-month experience exposing the student to a wide variety of patients subdivided into head and neck surgery categories, including cancer patients and patients with facial anomalies. He acquires a broad exposure to patients with burns of electrical, chemical, and thermal origin. The objectives are many; however, the majority of these are covered in the preoperative and postoperative care of these patients consisting of preoperative history and physical examination, laboratory tests, and associated studies. Monitoring the postoperative course, following the patient closely during surgery, as well as performing numerous duties for the postoperative patient in the plastic dressing room is required of the student. Finally, the student develops an in-depth understanding of fluid and electrolyte balance as well as dressing changes. 3 s.h. *Thompson*

PA 419. *Rehabilitation*. A two-month rotation exposing the student to a broad spectrum of post-treatment disease and injury as it relates to the patient undergoing rehabilitation. The student receives training in patient rehabilitation through historical and physical evaluation; participation in both inpatient and outpatient physical and occupational therapy services and weekly medical-surgical-rehabilitation conferences. Instruction is oriented toward the early return-to-work of disabled employees and toward matching physical capabilities with job demands. 3 s.h. *Goldwater*

PA 420. *Acute Care Unit*. A one month rotation which teaches the student post-operative care of the surgical patient who has undergone major and complex surgical procedures or suffered massive and severe trauma involving multiple organ systems. Special emphasis is centered on ventilatory assistance problems, open heart cases, neurosurgical problems and trauma cases. Though the student's activities are somewhat restricted in actual patient management, this area provides the student with an in-depth exposure to the complicated surgical patient and allows him to develop an understanding of the pathophysiology, physiology and reasoning for making major clinical decisions. 3 s.h. *Chief Surgical Resident*

PA 421. *Anatomy Lab.* A one month rotation that reinforces the student's exposure to anatomy for the purpose of becoming familiar with the anatomy that will be most useful during his clinical rotations. The student will work at his own pace under the direction of the physician in charge using the vast teaching aids in the anatomy department and supplementing this with selected readings. In addition, the student will attend all surgical and orthopedic conferences while on this rotation. 3 s.h. *Anatomy Staff*

Pediatric Rotations

PA 511. *General Pediatrics.* A two-month pediatric experience divided into three sections: newborn nursery, inpatient service, and outpatient clinic. The student attends all general pediatric conferences and those pertinent to the current area of experience. Emphasis is placed on the performance of peripheral venopunctures; starting and regulating intravenous infusions; complete blood counts; urinalyses; blood, stool, urine, and umbilical cultures; immunizations, PKU screening, vision screening, and electrocardiograms as they pertain to children and infants. The student is exposed to the spectrum of childhood illness and normal variations of growth and development through history taking and examinations. In addition, the student observes and examines normal newborns and through observation and experience in the intensive care nursery, learns techniques specific for the care of the immature and sick newborns. 6 s.h. *Pounds*

PA 512. *Newborn Nursery.* A two-month rotation that exposes the student to the evaluation of the newborn child and to those diseases and conditions which are prominent in the pediatric patient. The student further develops techniques specifically related to proper evaluation of a newborn child and in the performing of a detailed pediatric evaluation. The student has available the necessary samples and equipment to develop competence and skill in the accomplishment of routine pediatric diagnostic laboratory procedures. He is permitted to follow patients from admission to discharge for the purpose of becoming knowledgeable of therapeutic regimens and the various dispositions of the newborn. Prerequisite: PA 511. 6 s.h. *Pounds and Brumley*

PA 513. *Clinical Research Unit.* A two-month rotation that expose the student to a diversified research patient population. The student develops a proficiency in a wide variety of research and routine clinical procedures as applicable to the evaluation of each patient. He attends all daily morning and evening clinical rounds of each service and carries out the studies on patients as denoted by the attending staff. These tests include: routine laboratory analyses, tolerance testing, including intravenous glucose, insulin and tolbutamide studies; intravenous catheterizations, venous cutdowns on pediatric patients; nasogastric intubation of the pediatric patient and gastric analyses. The student is responsible for

recording and reporting clinical laboratory data while acquiring experience in the correlation of clinical signs and symptoms with laboratory data. 6 s.h. *Sidbury*

PA 514. *Pediatric Cardiology*. A two-month rotation exposing the student to the broad spectrum of cardiovascular disease, particular to the pediatric population, through the evaluation of patients by physical examination, assisting in the performance of diagnostic and therapeutic studies, and the interpretation of electrocardiograms and radiographic procedures. He follows patients from admission to discharge assisting in the care and analysis of patients with congenital and rheumatic heart disease, recording results of laboratory data and keeping progress notes under the guidance of the physician. Emphasis is placed on the origin, indications, and prognosis of disease states and the indications, limitations, and reliability of the methods available for the diagnosis and treatment of varying cardiovascular disorders. 6 s.h. *Porter*

PA 515. *Chest and Allergy—Pediatrics*. A two-month rotation providing the student with an in-depth exposure to patients with allergic and respiratory conditions through evaluation by special physical and diagnostic techniques. This exposure allows the student to compound a knowledge of the therapeutic regimens, their indications, availability, reliability and limitations in the treatment of respiratory and allergic disease. The student develops a proficiency at collecting the necessary diagnostic samples and carrying out numerous indicator studies on the involved pediatric population. 6 s.h. *Pounds*

Radiology Rotations

PA 601. *Gastrointestinal Radiology I*. A one-month rotation which reviews exposure factors, image formation and intensification, hypersensitivity and chemotoxicity of contrast media, patient preparation and precautions, and procedural methods involved in radiographic examination of the gastrointestinal tract. Emphasis is placed on proper study performance and the fluoroscopic and radiographic anatomy of the gastrointestinal tract and biliary tree with consideration given to the identification of normal and pertinent pathophysiologic abnormalities. 6 s.h. *Thompson and Staff*

PA 602. *Gastrointestinal Radiology II*. A three-month clerkship during which the student performs barium swallows, upper G.I. series with follow-through and barium enemas using cine and fluoroscopy for the identification of both normal and pathophysiologic abnormalities in the anatomy of the gastrointestinal tract. The student, under radiologist supervision, is responsible for the study and preliminary interpretation of all procedures performed. Pertinent radiographic anatomy and pathologic abnormalities are presented to the student in conferences and by lecture from the radiology house staff. 9 s.h. *Thompson and Staff*

PA 603. *Uroradiology*. A two-month experience in the performance

of intravenous urograms. Sufficient radiographic anatomy and pathophysiology is given to assist in the presentation of the completed intravenous urograms to the radiologist. Consideration is given to patient preparation, study technique, patient precautions, and the dosage calculation and administration of contrast media. 6 s.h. *Thompson and Staff*

PA 604. *Trauma of Soft Tissue and Bone.* A one-month rotation placing emphasis on the recognition of changes in bone density, presence of excessive bone destruction, soft tissue injury and infection and the dislocation and fracture of bones and joints. In addition, the student develops an in-depth understanding of bone maturation and the pathophysiological influences on bone growth. 3 s.h. *Thompson*

PA 605. *Chest Roentgenography I.* A one-month review of basic techniques for the roentgenographic examination of the chest. Emphasis is placed on patient preparation and the proficient performance of lamina-graphic, tomographic, fluoroscopic, and isotopic examinations of the chest. An introduction to lobar and segmental anatomy, silhouette signs, lobar and segmental collapse, and pleural signs is presented to the student. 3 s.h. *Thompson and Staff*

PA 606. *Chest Roentgenography II and III.* Two two-month segments during which the student performs numerous fluoroscopic, lamina-graphic, roentgenographic, angiographic, and isotopic examinations of the chest. Emphasis is placed on procedural techniques, radiographic quality, patient management, recognition and prevention of toxic reactions due to overexposure and hypersensitivity, and the recognition of normal and abnormal radiographs based on lobar and segmental changes, silhouette signs, and pleural and extrapleural signs. All preliminary screenings of abnormal radiographs and interpretations are subject to approval by the radiologist. 6 s.h. *Thompson and Staff*

PA 607. *Outside Radiologist.* A two-month experience with a community-based physician in the private practice of radiology. Participation in and the performance of numerous roentgenographic studies via fluoroscopy, laminagraphy, cine, nuclear scanning, and radiotherapy is required of the student. Emphasis is placed on initial screening and interpretation of chest roentgenograms and bone films to aid the radiologist in a more efficient practice of his specialty. In addition, the student receives exposure to a broad spectrum of pathophysiologically abnormal roentgenographic studies to enhance his knowledge and understanding of the normal and abnormal state. 6 s.h. *Thompson*

Industrial Medicine Rotations

PA 700. *Environmental Health.* A one-month rotation exposing the student to the basic principles of environmental health, including industrial toxicology, workmen's compensation laws, and labor and industrial relations via a seminar setting. This instruction will be supplemented by extensive readings in the aforementioned areas. 3 s.h. *Goldwater*

PA 701. *Industrial Hygiene Laboratory*. A two-month rotation exposing the student to the numerous methods of air sampling and analysis, and analysis of blood and urine for heavy metals and other toxic agents. A knowledge, understanding, and proficiency in the use of these methods is developed through practical application in both a laboratory and community setting. 6 s.h. *Staff*

PA 702. *Industrial Hygiene Survey Methods*. A two-month rotation that develops an understanding and proficiency in the evaluation of occupational hazards including chemicals, light, noise, dust, radiation, gases and other harmful agents. The student is taught the care and use of field survey instruments, the application of findings to epidemiological studies, and general principles of plant sanitation. 6 s.h. *Staff*

Pathology Rotations

PA 800. *Microbiology*. A one-month rotation that exposes the student to a wide variety of clinical material and presents the characteristics of numerous pathogenic bacteria and fungi as they relate to a broad spectrum of infectious disease processes. He learns to differentiate between normal flora, potentially-harmful flora, and highly virulent pathogens, and correlate these findings with the clinical manifestations of selected patients. In addition, antibiotic sensitivity patterns of bacteria are determined and interpreted on all pathogenic or potentially pathogenic bacteria isolated from clinical specimens. 3 s.h. *Osterhout*

PA 801. *Histology*. A two-month rotation that acquaints the student to the purpose of histology and presents the equipment necessary for the preparation of tissue slides following which the student is taught the basic principles of tissue processing, including fixation, decalcification, hand and automatic processing, blocking, embedding, cutting and staining; specific staining and histochemical procedures; cutostat and other frozen section methods; tissue manicuring for processing; and certain election microscopic and cytologic techniques to better acquaint the student with these areas. 6 s.h. *Pathology Staff*

PA 802. *Medical Photography*. A two-month rotation that presents, by lecture and practical assignment, basic photographic theory and principles including lighting, optics, photochemistry, camera handling techniques, color film selection, exposure determinations, and film processing as applied to pathology. 6 s.h. *Pathology Staff*

PA 803. *Pathology*. A six-month rotation in gross and microscopic pathology. A detailed consideration of the morphologic, physiologic, and biochemical manifestations of disease is presented. In addition, the student participates in the gross dissection, histologic examination, processing and analysis of morphologic, biochemical, and microbiological data, and the final interpretation and correlation of these results. 18 s.h. *Pathology Staff*

Appendix

A. Statutes of North Carolina Pertaining to the Possession and Use of Alcoholic Beverages

G.S. 18-90.1. Sale to or Purchase by Minors.

It shall be unlawful for:

1. Any person, firm or corporation knowingly to sell or give any of the products described in G.S. 18-64 to any minors under 18 years of age.
2. Any minor under 18 years of age to purchase or possess, or for anyone to aid or abet such minor in purchasing any of the products described in G.S. 18-64.
3. Any person, firm or corporation knowingly to sell or give any of the products described in G.S. 18-60 to any minor under 21 years of age.
4. Any minor under 21 years of age to purchase or possess, or for anyone to aid or abet such minor in purchasing any of the products described in G.S. 18-60.

G.S. 18-64. Definitions.

The term "beverages" as used in this article shall include:

1. Beer, lager beer, ale, porter, and other brewed or fermented beverages containing one-half of one per cent (1%) of alcohol by volume but not more than five per cent (5%) of alcohol by weight as authorized by the laws of the United States of America.
2. Unfortified wines, as used in this article, shall mean wine of an alcoholic content produced only by natural fermentation or by the addition of pure cane, beet, or dextrose sugar and having an alcoholic content of not less than five per centum (5%) and not more than fourteen per centum (14%) of absolute alcohol, the per centum of alcohol to be reckoned by volume.

which wine has been approved as to identity, quality and purity by the State Board of Alcoholic Control as provided in this chapter.

The term "person" used in this article shall mean any individual, firm, partnership, association, corporation, or other groups or combination acting as a unit.

The term "sale" as used in this article shall include any transfer, trade, exchange or barter in any manner or by any means, whatsoever, for a consideration.

G.S. 18-60. Definition of "Alcoholic Beverage."

The term "alcoholic beverage," as used in this article, is hereby defined to be and to mean alcoholic beverages of any and all kinds which shall contain more than fourteen per centum of alcohol by volume, and this article is not intended to apply to, or regulate, the possession, sale, manufacture or transportation of beer, wines or ales containing a lower alcoholic content than above specified, and whenever the term alcoholic beverages is used in this article, it shall be construed as defined in this section.

B. Statutes of North Carolina Pertaining to the Possession and Use of Certain Drugs

Under the provisions of G.S. 90-87 (General Statutes of North Carolina) (1) d. marijuana is defined as a narcotic drug.

G.S. 90-87 (9) further defines narcotic drugs: "Narcotic drugs" means coco (coca) leaves, opium, cannabis, peyote, mescaline, psilocybe mexicana, psilocybin, lysergic acid diethylamide, or other psychedelic drugs or hallucinogens, or any derivatives of any of these which possess hallucinogenic properties, and every other substance neither chemically nor physically distinguishable from them; and other drugs to which the federal narcotics laws may now apply; and any drug found by the State Board of Health, after reasonable notice and opportunity for hearing, to have an addiction-forming or addiction-sustaining liability similar to morphine or cocaine, from the effective date of determination of such finding by said State Board of Health.

G.S. 90-88. provides that "it shall be unlawful for any person to manufacture, possess, have under his control, sell, prescribe, administer, dispense, or compound any narcotic drug except as authorized in this article." (The authorization referred to is with respect to licensed druggists, pharmacists, physicians, and others, who can legally possess and dispense narcotic drugs.)

G.S. 90-111. Penalties for Violation. (a) Any person violating any provision of this article or any person who conspires, aids, abets, or procures others to do such acts shall upon conviction be punished, for the first offense, by a fine of not more than one thousand dollars (\$1,000.00) or be imprisoned in the penitentiary for not more than five

years, or both, in the discretion of the court. For a second violation of this article, or where in case of a first conviction of violation of this article, the defendant shall previously have been convicted of a violation of any law of the United States, or of this or any other state, territory, or district, relating to the sale or use or possession of narcotic drugs or marijuana, and such violation would have been punishable in this State if the offending act had been committed in this State, the defendant shall be fined not more than two thousand dollars (\$2,000.00) and be imprisoned not less than five nor more than ten years. For a third or subsequent violation of this article, or where the defendant shall previously have been convicted two or more times in the aggregate of a violation of any law of the United States, or of this or any other state, territory, or district relating to the sale, use or possession of narcotic drugs or marijuana, and such violation would have been punishable in this State, the defendant shall be fined not more than three thousand dollars (\$3,000.00) and be imprisoned in the penitentiary not less than fifteen (15) years nor more than life imprisonment.

(b) Upon conviction for a second or subsequent offense the sentence provided by this section shall not be suspended and probation shall not be granted unless the presiding judge shall find that the violation for which the defendant was convicted did not consist of peddling, selling, bartering or otherwise distributing narcotics to others in violation of this article, or the possession of narcotics for the purpose of peddling, selling, bartering or otherwise distributing narcotics to others in violation of this article. For the purpose of making the finding provided in this subsection before a sentence may be suspended, the defendant shall have the burden of proving that the violation for which he was convicted did not consist of peddling, selling, bartering or otherwise distributing narcotics to others in violation of this article or the possession of narcotics for the purpose of peddling, selling, bartering, or otherwise distributing narcotics to others in violation of this article. The charge contained in the warrant or bill of indictment shall not be considered in making such finding for the purpose of suspending the sentence.

(c) If the offense shall consist of the sale, barter, peddling, exchange, dispensing or supplying of marijuana or a narcotic drug to a minor by an adult in violation of any provision of this article, such person shall upon conviction be punished by a term of not less than ten years nor more than life imprisonment and shall be fined not more than three thousand dollars (\$3,000.00) for the first and all subsequent violations of this article, and the imposition or execution of sentence shall not be suspended, and probation shall not be granted.

C. Federal Statutes Pertaining to the Possession and Use of Certain Drugs

Marijuana is regulated by the Treasury Department and hallucinogenic drugs by the Bureau of Drug Abuse Control (Pure Food, Drug and

Cosmetic Act) of the Department of Health, Education and Welfare. Different statutes apply to each.

1. *Marijuana*

Title 26, Section 4741 imposes a tax on all transfers of marijuana of \$1.00 per ounce or fraction thereof upon those who have paid a special license tax and who have complied with regulations. A tax of \$100.00 per ounce or fraction thereof is imposed upon those who have not paid the special license tax and/or have not complied with the regulations.

Title 26, Section 4742 (a)—It shall be unlawful for any person, whether or not required to pay a special tax and register under section 4751 to 4753 inclusive, to transfer marijuana, except in pursuance of a written order of the person to whom such marijuana is transferred, on a form to be issued by the Secretary or his delegate. (Except by one engaged in professional practice, by prescription, or by an officer of the U.S.)

Title 26, Section 4744 makes it unlawful for a person (without license and tax) to acquire or obtain marijuana and to be unable, after reasonable notice, to produce the order form for this marijuana required by section 4742. Proof that a person has had possession of marijuana is presumptive evidence of guilt.

Title 26, Section 7237 (1966) fixes the following penalties for violation of Section 4742 (a) and 4744:

<i>Under Section 4744</i>	<i>Fine</i>	<i>Imprisonment</i>
1st Conviction	Not more than and/or \$20,000.00	Not less than 2 or more than 10 yrs.
2nd Conviction	Not more than and/or \$20,000.00	Not less than 5 or more than 20 yrs.
3rd Conviction	Not more than and/or \$20,000.00	Not less than 10 or more than 40 yrs.
<i>Under Section 4742</i>	<i>Fine</i>	<i>Imprisonment</i>
1st Conviction	Not more than and/or \$20,000.00	Not less than 5 or more than 20 yrs.
Other Convictions	Not more than and/or \$20,000.00	Not less than 10 or more than 40 yrs.

If the offender has reached his 18th birthday at time of the offense of selling, bartering, or giving away an (illicit) drug or marijuana to one not 18, or conspiring to do so, the imprisonment is not less than 10 or more than 40 years and/or a fine of not more than \$20,000.00.

2. *Hallucinogenic Drugs*

Title 21, Section 321 (V), (1966)—The term “depressant or stimulant drug” means . . . any substance which the Secretary (Health, Education and Welfare), after investigation, has found to have, and by regulation

designated as having, a potential for abuse because of its depressant and stimulant effect on the central nervous system or its hallucinogenic effect except the Secretary shall not designate under this paragraph . . . marijuana as defined in Section 4761. (This section defines marijuana as marijuana and practically all of its components, from seed to dried leaf.)

Title 21, Section 360 (a), (1966)—No person, other than an exempt person (see next paragraph) shall possess any depressant or stimulant drug otherwise than for personal use or for a member of his household or for his animal.

(An exempt person, referred to in this section, is one in the legal business of selling, treating with, or transporting these drugs. Also, one who is using the drug in research, teaching, or chemical analysis and not for sale.)

Title 21, Section 360 (a), 7., (1966)—No person, unless licensed or authorized and acting in the ordinary and authorized course of his business, profession, occupation or employment . . . shall sell, deliver, or otherwise dispose of any depressant or stimulant drug to any other person.

Title 21, Section 333 (1966) fixes the following penalties:

	<i>Fine</i>	<i>Imprisonment</i>
1st Conviction	Not more than and/or \$5,000.00	Not more than 1 yr.
2nd Conviction	Not more than and/or \$10,000.00	Not more than 3 yrs.

Any person who has attained his 18th birthday when the offense was committed who sells or disposes of depressant or stimulant drugs to one who has not attained his 21st birthday is subject to these penalties:

	<i>Fine</i>	<i>Imprisonment</i>
1st Conviction	Not more than and/or \$5,000.00	Not more than 2 yrs.
2nd Conviction	Not more than and/or \$15,000.00	Not more than 6 yrs.

1970

JULY

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BULLETIN OF DUKE UNIVERSITY

Directory of the
Officers, Faculty, and Staff
1970



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BULLETIN OF DUKE UNIVERSITY

Directory of the
Officers, Faculty, and Staff
1970-1971

Durham, North Carolina 1970

Volume 42

April 1970

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Hilrie Shelton Smith, D.D., Ph.D., Litt.D. <i>James B. Duke Professor Emeritus of American Religious Thought</i>	2721 Dogwood Road
Bessie Whitted Spence, B.D. <i>Assistant Professor Emeritus of Biblical Literature</i>	Methodist Retirement Home
Hersey Everett Spence, B.D., D.D., Litt.D. <i>Professor Emeritus of Religious Education</i>	Methodist Retirement Home
Frederick William Stocker, M.D. <i>Professor Emeritus of Ophthalmology</i>	1124 West Forest Hills Blvd.
W. A. Stumpf, Ph.D. <i>Professor Emeritus of Education</i>	127 Pinecrest Road
Clement Vollmer, Ph.D. <i>Professor Emeritus of German</i>	1617 Pinecrest Road
Warren Chase Vosburgh, Ph.D. <i>Professor Emeritus of Chemistry</i>	Route 1, Bahama, N. C.
Albert E. Wackerman, M.F. <i>Professor Emeritus of Forest Utilization</i>	P. O. Box 63 Blutton, S. C.
Arley John Walton, B.S.L., D.D. <i>Professor Emeritus of Church Administration</i>	3650 Mayflower Place Nashville, Tenn.

*Deceased 9-28-69.

Loring Baker Walton, Ph.D.	
<i>Professor Emeritus of Romance Languages</i>	2235 Cranford Road
Charles Eugene Ward, Ph.D.	2132 Bedford Ave., Apt. 10
<i>Professor Emeritus of English</i>	Yorktowne Village
Marie Anne Updike White, A.M.	
<i>Associate Professor Emeritus of English</i>	107 Pinecrest Road
Eugenia Remlin Whitridge, Ph.D.	
<i>Assistant Professor Emeritus of Sociology</i>	1511 West Pettigrew Street
*Ralph Sydney Wilbur, B.S. in M.E., M.E.	
<i>Professor Emeritus of Mechanical Engineering</i>	1018 Demerius Street
James Wesley Williams, M.S.	
<i>Professor Emeritus of Civil Engineering</i>	405 Carolina Circle
Frederick Eliphaz Wilson, A.M.	
<i>Associate Professor Emeritus of German</i>	1115 Iredell Street
Robert Renbert Wilson, Ph.D., LL.D.	
<i>James B. Duke Professor Emeritus of Political Science</i>	717 Anderson Street
Frederick Adolphus Wolf, Ph.D.	
<i>James B. Duke Professor Emeritus of Botany</i>	924 Urban Avenue

Instructional Staff

(The date in parentheses indicates the year of appointment.)

†Wallace Dare Abbey (1968), D.D.S. (Ohio State University)	
<i>Associate in Orthodontics in</i>	
<i>Department of Surgery</i>	1400 Georgia Avenue
Frances Dorothy Acomb (1945), Ph.D. (Chicago)	1000 North Duke Street
<i>Associate Professor of History</i>	Apartment 2
Dock W. Adams, M.A. (1969) (Missouri)	502 Landerwood Drive
<i>Temporary Instructor of English</i>	Chapel Hill, N. C.
Paul Wesley Aitken (1964), Th.M. (Duke)	
<i>Assistant Professor of Pastoral Care</i>	2909 Harriman Drive
John Richard Alden (1955), Ph.D. (Michigan)	
<i>James B. Duke Professor of History</i>	2736 Dogwood Road
Irving E. Alexander (1963), Ph.D. (Princeton)	
<i>Professor of Psychology and Professor of Medical</i>	
<i>Psychology in Department of Psychiatry</i>	1111 Watts Street
†Arthur Tilo Alt (1961-65; 1967), Ph.D. (Texas)	
<i>Assistant Professor of German</i>	66 A Colonial Apts.
John Cooley Altrocchi (1957), Ph.D. (California)	
<i>Associate Professor of Psychology and Associate Professor</i>	
<i>of Medical Psychology in Department of Psychiatry</i>	1110 Woodburn Road
J. M. Amatulli (1969), B.S. (Juniata)	
<i>Associate in Pathology</i>	2112 Broad Street, Apartment 14
Marcelino Amaya (1966), M.D. (Nacional Automona de Mexico)	
<i>Associate in Psychiatry</i>	2928 Friendship Road
Dennis Bernard Amos (1962) M.D. (London)	
<i>James B. Duke Professor of Immunology and</i>	Route 3
<i>Experimental Surgery</i>	Hillsborough, N. C.
Nicholas Anastasiow (1966), Ph.D. (Stanford)	
<i>Associate Professor of Education</i>	2948 Friendship Road

*Deceased 9-20-69.

†Through 6-30-69.

‡Sabbatical leave, fall semester 1969-70.

- Carl L. Anderson (1955), Ph.D. (Pennsylvania)
Associate Professor of English Route 2, Box 366
- Edward E. Anderson (1966), M.D. (Duke)
Associate Professor of Urology 1 Winthrop Court
- Lewis Edward Anderson (1936), Ph.D. (Pennsylvania)
Professor of Botany 2020 Sunset Avenue
- Nels Anderson (1966), Ph.D. (Purdue)
Assistant Professor of Obstetrics and Gynecology and
Assistant Professor of Physiology and Pharmacology Route 1
Hillsborough, N. C.
- Roger F. Anderson (1950), Ph.D. (Minnesota)
Professor of Forest Entomology 2528 Perkins Road
- William B. Anderson (1965), M.D. (Minnesota)
Assistant Professor of Psychiatry 3117 Oxford Drive
- William Banks Anderson, Jr. (1962), M.D. (Harvard)
Associate Professor of Ophthalmology 3437 Sheridan Drive
- Thomas E. Andreoli (1965), M.D. (Georgetown)
Associate Professor of Medicine and
Assistant Professor of Physiology 1508 Ward Street
- William G. Anlyan (1952), M.D. (Yale)
Professor of Surgery 1516 Pinecrest Road
- Stanley H. Appel (1964-65; 1967), M.D. (Columbia)
Associate Professor of Neurology and
Associate Professor of Biochemistry 2513 Wrightwood Avenue
- Mahadeo L. Apte (1965), Ph.D. (Wisconsin)
Associate Professor of Linguistics in Department of Slavic
Languages and Literatures and Associate Professor of
Anthropology 1017 Norwood Avenue
- Richard E. Aquila (1968), Ph.D. (Northwestern)
Assistant Professor of Philosophy 3319 Chapel Hill Road
- Jay Morris Arena (1933), M.D. (Duke)
Professor of Pediatrics 1403 Woodburn Road
- Kiro Pete Arges (1953), M.S. (Tennessee)
Assistant Professor of Civil Engineering 802 West Maynard Avenue
- *Clara Franzini-Armstrong (1968), Ph.D. (Pisa)
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and Associate in Anatomy 2914 Friendship Road
- †Clay M. Armstrong (1966), M.D. (Washington)
Assistant Professor of Physiology and
Assistant Professor of Neurology 2914 Friendship Drive
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Professor of Electrical Engineering 2714 Wrightwood Avenue
- †Arnfinn Aulie (1967), Cand. Real. (Oslo)
Temporary Instructor in Zoology Box 493, Route 2
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- §Patricia Avant (1968), M.S.N. (North Carolina)
Assistant Professor of Nursing 193 Daniels Road
Chapel Hill, N. C.
- Hans W. Baade (1960), LL.M. (Duke)
Professor of Law 2512 North Duke Street
- Kurt W. Back (1959), Ph.D. (Massachusetts Institute of Technology)
Professor of Sociology and Professor of
Medical Sociology in Department of Psychiatry 2735 McDowell Street

*Through 6-30-69.

†Through 6-30-69.

‡Through 6-30-69.

§Through 6-30-69.

- Joseph Randle Bailey (1946), Ph.D. (Michigan)
Professor of Zoology 2517 Sevier Street
- Charles M. Baker (1968), B.A. (Westminster-Pennsylvania)
Assistant Professor of Naval Science 2702 Farthing Street
- Frank Baker (1960), Ph.D. (Hull)
Professor of English Church History 1505 Pinecrest Road
- Lenox Dial Baker (1937), M.D. (Duke)
Professor of Orthopaedic Surgery Box 3706 Duke Hospital
- Marie Baldwin (1949), M.D. (South Carolina)
Assistant Professor of Psychiatry Highland Hospital
 Asheville, N. C.
- Helmy H. Baligh (1967), Ph.D. (California)
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 Chapel Hill, N. C.
- M. Margaret Ball (1963), Ph.D. (Stanford)
Professor of Political Science 2305 Elmwood Avenue
- Robert H. Ballantyne (1962), Ed.D. (Washington State)
Associate Professor of Education 2510 Wrightwood Avenue
- Sarah Kathryn Barclay (1965), M.S.S. (Tulane)
Assistant Professor of Psychiatric Social Work 2007 House Avenue
 Apartment 21
- Earl Francis Baril (1969), Ph.D. (Connecticut)
Assistant Professor of Clinical Pharmacology 3600 Tremont Dr.
 Apartment G-1
- Norman Howard Barlow (1955), Ph.D. (Duke)
Assistant Professor of Romance Languages 3852 Somerset Drive
- Robert L. Barnes (1965), Ph.D. (Duke)
Professor of Forest Biochemistry 5303 Revere Road
- Jean Scott Barr (1969), M.S. (Case Western)
Associate in Physical Therapy 121 Whitfield Road
- Roger Coke Barr (1969), Ph.D. (Duke)
Assistant Professor of Pediatrics and Biomedical Engineering 121 Whitfield Road
- Louis A. Barre, III (1969), B.S. (Centenary)
Professor of Aerospace Studies 2330 Hilton Avenue
- William Barry, Jr. (1955), M.D. (Pennsylvania)
Associate Professor of Radiology and Assistant Professor of Medicine 2713 McDowell Street
- Frank Houston Bassett, III (1963), M.D. (Louisville)
Associate Professor of Orthopaedic Surgery and Assistant Professor of Anatomy 3940 Dover Road
- Hans G. E. Bauer (1968), Ph.D. (Göttingen)
Visiting Professor of Zoology 1106 Douglas Street, Apartment 304
- George J. Baylin (1939), M.D. (Duke)
Professor of Radiology and Associate in Anatomy 2535 Wrightwood Avenue
- Charles A. Bayliss (1952), Ph.D. (Harvard)
Professor of Philosophy 2610 Sevier Street
- *Thomas A. Baylis (1967), M.A. (California)
Instructor in Political Science 1406 Duke University Road
- William Waldo Beach (1946), B.D., Ph.D. (Yale)
Professor of Christian Ethics 130 Pinecrest Road
- Dorothy Waters Beard (1938), R.N. (Vanderbilt)
Associate in Surgery Route 3, Hillsborough, N. C.
- Joseph Willis Beard (1937), M.D. (Vanderbilt)
James B. Duke Professor of Surgery in Charge of Experimental Surgery and Professor of Virology Route 3, Hillsborough, N. C.

*Through 8-31-69.

- †Roland Frederick Becker (1951), Ph.D. (Northwestern)
Associate Professor of Anatomy 2307 Alabama Avenue
- Evelyn M. Bedard (1967), M.P.H. (Johns Hopkins)
Assistant Professor of Nursing 3103 Buckingham Road
- Victor S. Behar (1968), M.D. (Duke)
Associate in Medicine 3824 Hillgrand Drive
- W. Herman Bell (1969), Ph.D. (Northwestern)
Lecturer in Swahili 106A Bernard Street
 Chapel Hill, N. C.
- Cleaves M. Bennett (1967), M.D. (Rochester)
Associate in Medicine 2507 Alpine Road
- Robert E. Benway (1967), M.D. (Miami)
Associate in Anesthesiology in the Department of Surgery 2514 Tryon Road
- †William P. Beres (1966), Ph. D. (Massachusetts Institute of Technology)
Assistant Professor of Physics 1200 Leon Street, Apartment G-7
- John Agar Bergerson (1969), V.M.D. (Pennsylvania)
Associate in Anatomy Route 2, Chapel Hill, N. C.
- §Kenneth H. Berkley (1968), B.S. (Idaho)
Associate Professor of Naval Science 3537 Hamstead Court
- Frederick Bernheim (1930), Ph.D. (Cantab.)
James B. Duke Professor of Pharmacology 115 Woodridge Drive
- Mary Lilius Christian Bernheim (1930), Ph.D. (Cantab.)
Professor of Biochemistry 115 Woodridge Drive
- Helga Wilde Bessent (1964), M.A. (Vanderbilt)
Lecturer in German 2117 Englewood Avenue
- Helen Smith Bevington (1943), M.A. (Columbia)
Associate Professor of English 4428 Guess Road
- Lawrence C. Biedenharn, Jr. (1961), Ph.D. (Massachusetts Institute of Technology)
Professor of Physics 2716 Sevier Street
- Justus Bier (Spring semesters since 1964), Ph.D. (Zurich)
Adjunct Professor of Art 201 Pear Tree Lane
 Raleigh, N. C.
- Helen Frances Bigler (1969), DNSC (Boston Univ.)
Assistant Professor of Nursing 2835 Stuart Drive
- William Dwight Billings (1952), Ph.D. (Duke)
James B. Duke Professor of Botany 1628 Marion Avenue
- Edward G. Bilpuch (1962), Ph.D. (North Carolina)
Associate Professor of Physics Box 674, Chapel Hill, N. C.
- Morris Edward Binkley, Jr. (1968), Ph.D. (Cornell)
Visiting Assistant Professor of Physics 1200 Leon Street, Apartment D-8
- Warren P. Bird (1968), M.S.L.S. (Columbia)
Assistant Professor of Medical Literature Apartment 10
 2007 House Avenue
- Anthony R. Birley (1968), D.Phil. (Oxon.)
Visiting Lecturer in Classical Studies 814 Onslow Street
- David E. Black (1969), Ph.D. (Massachusetts Institute of Technology)
Assistant Professor of Economics 1829 Front Street, Apartment D-15
- Martin Lee Black, Jr. (1930), M.B.A. (Northwestern), C.P.A.
Professor of Accounting in the Department of Management Sciences 135 Pinecrest Road
- John O. Blackburn (1962), Ph.D. (Florida), C.P.A.
Professor of Economics 208 Pineview Road
- Frances Blackwell (1969), M.N. (Florida)
Instructor in Psychiatric Nursing 300 W. Trinity Avenue
 Apartment 14

†Through 8-31-69.

‡Through 8-31-69.

§Through 8-31-69.

- Robert Lincoln Blake (1949)
Associate in Medical Art in the
Division of Audiovisual Education 609 Ruby Street
- Robert G. Blaker (1968), Ph.D. (Pennsylvania)
Assistant Professor of Pathology 3511 Courtland Drive
- Jackson O. Blanton (1968), Ph.D. (Oregon State)
Assistant Professor of Geology Brooks Avenue
 Atlantic Beach, N. C.
- Jacob Joseph Blum (1962), Ph.D. (Chicago)
Professor of Physiology 2525 Perkins Road
- Edna May Blumenthal (1963), B.S. (Cincinnati)
Associate in Physical Therapy 910 Lambeth Circle
- Morton Bogdonoff (1957), M.D. (Cornell)
Professor of Medicine 2425 Wrightwood Avenue
- John P. Boineau (1965), M.D. (Duke)
Associate Professor of Pediatrics and
Assistant Professor of Medicine 2802 Legion Avenue
- *William L. Boletta (1967), Ph.D. (Vanderbilt)
Assistant Professor of German 303 N. Columbia St.
 Chapel Hill, N. C.
- Robert A. Bonar (1959), Ph.D. (California)
Associate Professor of Biophysics in
Department of Surgery Route 2, Box 407-A
 Chapel Hill, N. C.
- Allan Hadley Bone (1944), M.M. (Eastman)
Professor of Music 2725 Sevier Street
- James Bonk (1959), Ph.D. (Ohio State)
Associate Professor of Chemistry 112 Pinecrest Road
- Cazlyn Green Bookhout (1935), Ph.D. (Duke)
Professor of Zoology 1307 Alabama Avenue
- Elizabeth Circle Bookhout (1932-43; 1945), Ph.D. (New York)
Professor of Physical Education 1307 Alabama Avenue
- Howard R. Boozer (1968), Ph.D. (Washington Univ.)
Adjunct Professor of Education 4005 Picardy Drive
 Raleigh, N. C.
- Lloyd J. Borstelmann (1953), Ph.D. (California)
Associate Professor of Psychology and Professor of Medical
Psychology in Department of Psychiatry 2506 Francis Street
- Jack Botwinick (1963), Ph.D. (New York)
Professor of Medical Psychology in the Department of
Psychiatry and Lecturer in Psychology 2433 Wrightwood Avenue
- James M. Boughton (1969), Ph.D. (Duke)
Visiting Assistant Professor of Economics 2727 Spencer Street
- Nancy Bowers (1965), B.S. (Columbia)
Assistant Professor of Sociology 1408 Duke University Road
- Ruth M. Bowers (1967), M.A. (Chicago)
Associate Professor of Nursing 5114 Shady Bluff Street
- Francis Ezra Bowman (1945), Ph.D. (Harvard)
Professor of English 2114 Woodrow Street
- Saul Boyarsky (1963), M.D. (Vermont)
Professor of Urology and Assistant
Professor of Physiology and Director of Rehabilitation 2713 Sevier Street
- Thomas A. Boyle (1957), M.S. (Lehigh)
Associate Professor of Mechanical Engineering 1308 Anderson Street
- William Boyle (1967), Ph.D. (Glasgow)
Associate Professor of Immunology 3906 Hillgrand Drive
- J. E. Boynton (1968), Ph.D. (California at Davis)
Assistant Professor of Botany Apartment 4-D,
 632 LaSalle Street

*Through 8-31-69.

- Reinier Braams (1969), Ph.D. (Cambridge)
Visiting Professor of Zoology 2021 Dartmouth Drive
- *Melvin O. Braaten (1965), Ph.D. (North Carolina State)
Assistant Professor of Forest Biometry and
Lecturer in Mathematics 3111 Sherbon Drive
- William Dalton Bradford (1966), M.D. (Western Reserve)
Assistant Professor of Pathology and
Associate in Pediatrics 3724 Hope Valley Road
- †David Gilbert Bradley (1949), Ph.D. (Yale)
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- Charles Kilgo Bradsher (1939), Ph.D. (Harvard)
James B. Duke Professor of Chemistry 118 Pinecrest Road
- Ralph Braibanti (1953), Ph.D. (Syracuse)
James B. Duke Professor of Political Science 3805 Darby Road
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Assistant Professor of Political Science 2303 Lednum St., Apt. C-E
- Ralph Brauer (1966), Ph.D. (Rochester)
Professor of Physiology and Pharmacology and 7205 Wrightsville Avenue
Chief of Laboratory of Marine Physiology Wilmington, N. C.
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Assistant Professor of Anesthesiology 2227 Cranford Road
- Elizabeth Bregg (1968), M.P.H. (North Carolina)
Associate Professor of Nursing 3609 Duke Homestead Road
- Jack W. Brehm (1958), Ph.D. (Minnesota)
Professor of Psychology 2736 Montgomery Street
- Mary Lee Brehm (1969), Ph.D. (North Carolina)
Assistant Professor of Medical Sociology 1212 Roosevelt Drive
 Chapel Hill, N. C.
- Klaus Brendel (1967), Ph.D. (Berlin)
Assistant Professor of Pharmacology Apartment C-F, 2303 Lednum Street
- Marianne Breslin (1968), M.D. (Medical Academy, Dusseldorf, Germany)
Associate Professor of Psychiatry 1604 Michaux Rd., Chapel Hill, N. C.
- Bernard Bressler (1954), M.D. (Washington)
Professor of Psychiatry 2700 Circle Drive
- Rubin Bressler (1961), M.D. (Duke)
Professor of Medicine and Professor of Pharmacology 1100 Woodburn Road
- David A. Brewer, M.D. (1969), (Oklahoma)
Associate in Medicine 918 Lambeth Circle
- *Linda Y. Bright (1968), M.S.N. (Maryland)
Instructor in Nursing Apartment 16-F
 905 Lambeth Circle
- Mary S. Britt (1969), M.S. (Bowman Gray)
Associate in Pathology 2 Maxwell Road
 Chapel Hill, N. C.
- Irwin A. Brody (1964), M.D. (Pennsylvania)
Associate Professor of Neurology in the
Department of Medicine Route 1
 Hillsborough, N. C.
- Vartkes L. Broussalian, Ph.D. (1969), (California at Los Angeles)
Visiting Professor of Economics 2733 Sevier Street
- Earl I. Brown, II (1960), Ph.D. (Texas)
J. A. Jones Professor of Civil Engineering 1631 Marion Avenue
- Frances Campbell Brown (1931), Ph.D. (Johns Hopkins)
Professor of Chemistry 1205 Dwire Place
- *Through 8-31-69.
 †Sabbatical leave 1969-70.

- †Ivan Willard Brown, Jr. (1940-1942; 1945), M.D. (Duke)
James B. Duke Professor of Surgery 1709 Vista Street
- Myrtle Irene Brown (1967), R.N., Ph.D. (New York)
Professor of Nursing 3103 Buckingham Road
- George W. Brumley, Jr. (1967), M.D. (Duke)
Assistant Professor of Pediatrics 3318 Devon Road
- Dorothy J. Brundage (1968), M.N. (Emory)
Instructor in Nursing Route 2, Box 258
Mebane, N. C.
- Anne-Marie Bryan (1961), M.A.T. (Duke)
Assistant Professor of Romance Languages Apartment 28F
- Edward H. Bryan (1960), Ph.D. (Wisconsin)
Professor of Civil Engineering Valley Terrace Apartments
- Paul Robey Bryan, Jr. (1951), Ph.D. (Michigan)
Associate Professor of Music 2743 Sevier Street
- Edwin Constant Bryson (1931), LL.B. (Oregon)
Professor of Law and Professor of Legal Medicine 1108 Watts Street
- ‡Marion Bryson (1962), Ph.D. (Iowa State)
Associate Professor of Mathematics and G-16 Croasdaile Apartments
Associate Professor of Community Health Sciences
- Jerry B. Buchanan (1969), M.D. (Kentucky)
Associate in Radiology 2900 Arnold Street
- C. Edward Buckley (1963), M.D. (Duke)
Associate Professor of Medicine and Assistant Professor of 24-D Colonial Apartments
Microbiology and Immunology
- Rebecca Hatcher Buckley (1968), M.D. (North Carolina)
Assistant Professor of Pediatrics and Assistant 3621 Westover Road
Professor of Immunology
- Louis J. Budd (1952), Ph.D. (Wisconsin)
Professor of English 3621 Westover Road
- Albert George Buehler (1955), M.A. (North Carolina)
Associate Professor of Physical Education 2753 McDowell Street
- John Buettner-Janusch (1965), Ph.D. (Michigan)
Professor of Anatomy and Professor of Zoology 1718 Woodlawn Road
- Grace Bullock (1957-59; 1967), M.S.N. (North Carolina)
Assistant Professor of Nursing 1528 Hermitage Court
- Donald Smiley Burdick (1962), Ph.D. (Princeton)
Associate Professor of Mathematics 3729 Hermine Street
- Peter Burian (1968), M.A. (Princeton)
Instructor in Classical Studies 108 Emerald Circle
- Peter M. Burkholder (1965), M.D. (Cornell)
Associate Professor of Pathology 804 Green Street, Apartment D-3
- *Jacob Burlak (1965), Ph.D. (Cantab.)
Associate Professor of Mathematics 2815 Welcome Drive
- Richard O. Burns (1964), Ph.D. (Illinois)
Associate Professor of Microbiology 2736 Montgomery Street
- Ewald W. Busse (1953), M.D. (Washington)
J. P. Gibbons Professor of Psychiatry Route 3, Kelly Drive
- Ronald R. Butters (1967), Ph.D. (Iowa)
Assistant Professor of English 1132 Woodburn Road
- Thomas A. Butters (1968), M.A. (Ohio Wesleyan)
Instructor in Physical Education 15 Jefferson Drive
1504 Lamont Court
Chapel Hill, N. C.

*Leave of absence 1969-70.

‡Leave of absence 1969-70.

‡Leave of absence 1969-70.

- Gale H. Buzzard (1957), Ph.D. (North Carolina State)
Assistant Professor of Mechanical Engineering 2716 Tryon Road
- John B. Cahoon, Jr. (1958), R.T. (Duke)
Assistant Professor of Radiologic Technology 2418 Perkins Road
- Clark Cahow (1968), Ph.D. (Duke)
Assistant Professor in the Faculty of Arts and Sciences 1106 Watts Street
- Jasper Lamar Callaway (1937), M.D. (Duke)
James B. Duke Professor of Dermatology 828 Anderson Street
- Edmund McCullough Cameron (1926), A.B. (Washington & Lee)
Director of Physical Education and Athletics 2818 Chelsea Circle
- †Nancy W. Cameron (1967), M.S.N. (Emory)
Instructor in Nursing 3812 Noremac Drive, Raleigh, N. C.
- †Janet E. Campbell (1962), M.A. (Chicago)
Assistant Professor of Nursing East Lake Ann Drive
 Route 8, Raleigh, N. C.
- Ramon V. Canent (1965), M.D. (Santo Tomas, Manila)
Assistant Professor of Pediatrics 3314 Waterbury Drive
- Alfred K. Canterbury (1967), B.S. (U.S.A.F. Academy)
Assistant Professor of Aerospace Studies 5312 Newhall Road
- Judith B. Cantey (1969), M.P.H. (North Carolina)
Associate in Physical Therapy 2023 Granville Circle
- M. Paul Capp (1962), M.D. (North Carolina)
Associate Professor of Radiology and Assistant Professor of Pediatrics 1334 Welcome Circle
- Peter Carbone (1966), Ed.D. (Harvard)
Assistant Professor of Education 111 Brenrose Circle
- Leonard Carlitz (1932), Ph.D. (Pennsylvania)
James B. Duke Professor of Mathematics 2303 Cranford Road
- John W. Carlton (1969), Ph.D. (Duke)
Adjunct Professor of Preaching 337 West Pine Street
 Wake Forest, N. C.
- David Williams Carpenter (1929), Ph.D. (Duke)
Professor of Physics 137 Pinecrest Road
- Dwight W. Carpenter (1966), Ph.D. (Illinois)
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Professor of Psychology and Professor of Medical Psychology in Department of Psychiatry 3030 Glendale Avenue
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- William H. Cartwright (1951), Ph.D. (Minnesota)
Professor of Education 3610 Britt Street
- Thomas R. Cate (1968), M.D. (Vanderbilt)
Associate Professor of Medicine 3123 Camelot Court
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- Patrick J. Cavanaugh (1960), M.D. (St. Louis)
Professor of Radiology Route 1, Box 171
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- B. F. Caviness (1967), Ph.D. (Carnegie Institute of Technology)
Assistant Professor of Mathematics 2744 Sevier Street
- *Jane Shearin Caviness (1967), M.S. (Carnegie Institute of Technology)
Instructor in Mathematics 3600 Tremont Drive

*Through 8-31-69.

†Through 1-31-69.

‡Leave of absence through 1-1-70.

- John W. Cell (1962), Ph.D. (Duke)
Assistant Professor of History 2101 Dartmouth Drive
- Jack B. Chaddock (1966), Sc.D. (Massachusetts Institute of Technology)
Professor of Mechanical Engineering 2713 Spencer Street
- Leon E. Chaiken (1952), M.F. (Cornell)
Professor of Forest Management 2737 Dogwood Road
- Arthur C. Chandler (1965), M.D. (Duke)
Assistant Professor of Ophthalmology and Associate in Anatomy 2408 Alpine Road
- Tze Isaac Chao (1969), B.D. (McCormick Seminary)
Lecturer in Chinese 2528 Sevier Street
- Roger C. Chapman (1969), M.A. (California at Berkeley)
Assistant Professor of Forest Biometry 5141 Norman Place
 Raleigh, N. C.
- James H. Charlesworth (1969), Ph.D. (Duke)
Assistant Professor of Religion Route 7, Box 177
- Linda Charnes (1968), M.N. (Florida)
Instructor in Fundamentals in School of Nursing 76B Colonial Apartments
- James T. Chen (1965), M.D. (National Defense Medical Center, Taipei, Taiwan)
Assistant Professor of Radiology 2528 Sevier Street
- Ronald W. Chen (1962), Ph.D. (California)
Assistant Professor of Experimental Surgery 1011 Anderson Street
- Walter Boris Cherny (1957), M.D. (McGill)
Professor of Obstetrics and Gynecology 2 Kimberly Drive
- Clifton C. Cherpach (1958-67; 1968), Ph.D. (Johns Hopkins)
Professor of Romance Languages 2611 McDowell Street
- Donald B. Chesnut (1965), Ph.D. (California Institute of Technology)
Associate Professor of Chemistry 4404 Malvern Road
- Arthur Christakos (1963), M.D. (South Carolina)
Associate Professor of Obstetrics and Gynecology 2608 Winton Road
- †C. Donald Christian (1964), M.D., Ph.D. (Duke)
Associate Professor of Obstetrics and Gynecology and Assistant Professor of Anatomy 1023 Sycamore Street
- George C. Christie (1967), S.J.D. (Harvard)
Professor of Law 1632 University Drive
- Giorgio Ciompi (1964), M.A. (Paris Conservatory)
Artist in Residence in the Department of Music 33 Kimberly Drive
- James R. Clapp (1963), M.D. (North Carolina)
Associate Professor of Medicine Route 3
 King Charles Road
- Edgar W. Clark (1963), Ph.D. (California)
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- Elon Henry Clark (1934)
Professor of Medical Art in the Division of Audiovisual Education 801 West Maynard Avenue
- Henry B. Clark (1966), Ph.D. (Yale)
Associate Professor of Religion 3108 Camelot Court
- Howard Clark (1968), Ph.D. (Maryland)
Associate Professor of Mechanical Engineering and Biomedical Engineering 2716 Eton Road
- Lelia Ross Clark (1949), M.A. (Columbia)
Professor of Nursing Service 1506 Woodland Drive
- Peter B. Clark (1967), Ph.D. (Massachusetts Institute of Technology)
Assistant Professor of Economics 1508 Alabama Avenue
- Romane Lewis Clark (1953), Ph.D. (Iowa)
Professor of Philosophy 2511 Sevier Street

†Through 6-30-69.

- *Robert B. Claytor (1964), Th.M. (Duke)
Instructor in Clincial Pastoral Education 1646 Marion Avenue
- †Edward C. Clement (1968), M.S. (St. Louis University)
Associate in Community Health Science 2905 Friendship Road
- Edward Clifford (1965), Ph.D. (Minnesota)
Associate Professor of Medical Psychology in Department of Psychiatry and Associate Professor of Psychology in Plastic Surgery in Department of Surgery 920 Monmouth Avenue
- Frank W. Clippinger (1957), M.D. (Washington)
Associate Professor of Orthopaedic Surgery 3514 Rugby Road
- G. Wayne Clough (1969), Ph.D. (California)
Assistant Professor of Civil Engineering 14 Ashley Road
- John L. E. Clubbe (1966), Ph.D. (Columbia)
Assistant Professor of English 209 Watts Street
- John M. Clum (1966), Ph.D. (Princeton)
Assistant Professor of English Apartment N-3B
 1500 Duke University Road
- Harry M. Cocowitch (1967), B.S. (Alabama)
Professor of Naval Science R.F.D. 2, Box 66
- John Coie (1968), Ph.D. (California at Berkeley)
Assistant Professor of Psychology 2801 Dogwood Road
- †Robert Taylor Cole (1935), Ph.D. (Harvard)
James B. Duke Professor of Political Science 7 Sylvan Road
- T. Boyce Cole (1969), M.D. (North Carolina)
Assistant Professor of Otolaryngology
- Andrew P. Collins (1969), M.S.D. (Washington) Apt. 15, 18 Balmoray Court
Assistant Professor of Orthodontics Yorktowne Apartments
- Joel G. Colton (1947), Ph.D. (Columbia)
Professor of History 1616 Pinecrest Road
- Robert Merle Colver (1953), Ed.D. (Kansas)
Associate Professor of Education 2720 Circle Drive
- Norman Francis Conant (1935), Ph.D. (Harvard)
James B. Duke Professor of Microbiology Route 7, Box 335,
 Garrett Road
- §Apostolos Condos (1966), Ph.D. (Iowa State)
Assistant Professor of Economics 1309-D Leon Street
- Hewlette Connell (1968), M.D. (Medical College of Georgia)
Assistant Professor in Radiology 2617 McDowell Road
- ||Frank S. Conte
Visiting Associate Professor of Zoology
- **Mary Lee Cook (1968), M.P.N. (North Carolina)
Instructor in Nursing 618-C Hibbard
 Chapel Hill, N. C.
- ††Samuel D. Cook (1966), Ph.D. (Ohio State)
Associate Professor of Political Science 2733 Sevier Street
- Hallie M. Coppedge (1966), M.S.W. (North Carolina)
Associate in Psychiatric Social Work 3435 Cromwell Road
- Thomas Howard Cordle (1950), Ph.D. (Yale)
Associate Professor of Romance Languages 916 West Markham Avenue
- Bruce A. Corrie (1965), M.S. (Indiana)
Assistant Professor of Physical Education 3223 Haddon Road
- *Through 1-17-69.
 †Through 12-31-68.
 ‡Leave of absence 2-1-69 through 6-30-69.
 §Through 8-31-68.
 ||1-24-69 through 7-31-69.
 **Through 5-31-69.
 ††Leave of absence 1969-70.

- Philip Costanza (1968), Ph.D. (Florida)
Assistant Professor of Psychology 304 Ransom Street
 Chapel Hill, N. C.
- John D. Costlow (1959), Ph.D. (Duke)
Professor of Zoology 201 Ann Street
 Beaufort, N. C.
- Sheila J. Counce-Nicklas (1968), Ph.D. (Edinburgh)
Assistant Professor of Anatomy 3101 Camelot Court
- Philip Robert Cousin (1969), S.T.B. (Boston)
Visiting Lecturer in Church and Society 919 Jerome Road
- Dorothy Covalt-Dunning (1968), Ph.D. (Tufts)
Temporary Instructor in Zoology 1100 Virginia Avenue
 Apartment B-14
- R. Merritt Cox (1966), Ph.D. (Wisconsin)
Assistant Professor of Romance Languages 1829 Front Street
- Robert Calvin Cox (1942), M.A. (Columbia)
Associate Professor of Physical Education 1913 University Drive
- ||Annabelle T. Craddock (1967), M.D. (Duke)
Associate in Anesthesiology 2549 Sevier Street
- Joyce Crane (1960-62; 1964), M.S.N. (Western Reserve)
Associate Professor of Nursing 3027 Glendale Avenue
- Marion Carlyle Crenshaw, Jr. (1964), M.D. (Duke)
Assistant Professor of Obstetrics and Gynecology and
Associate in Physiology Route 8, Box 161, Roxboro Road
- Jon Christopher Crocker (1966), Ph.D. (Harvard)
Assistant Professor of Anthropology Route 7, Box 216
- Kathryn Crossland (1967), Ed.D. (Florida)
Professor of Nursing 3600 Tremont Drive
- Elaine Kobrin Crovitz (1965), Ph.D. (Duke)
Assistant Professor of Medical Psychology in
Department of Psychiatry and Lecturer in Psychology 2745 Montgomery Street
- Herbert Crovitz (1963), Ph.D. (Duke)
Associate Professor of Medical Psychology in Department
of Psychiatry and Lecturer in Psychology 2745 Montgomery Street
- *William L. Culberson (1955), Ph.D. (Wisconsin)
Associate Professor of Botany King Road, Route 7
- †Robert A. Culp, Jr. (1968), Ph.D. (Alabama)
Visiting Assistant Professor of Chemistry 63-D Colonial Apartments
- William D. Currie (1967), Ph.D. (North Carolina)
Assistant Professor of Radiology 3611 Randolph Road
- Robert Earl Cushman (1945), B.D., Ph.D. (Yale)
Professor of Systematic Theology 2719 Spencer Street
- †W. Kenneth Cuyler (1959), Ph.D. (Duke)
Professor of Obstetrics and Gynecology and Associate Professor
of Cytology and Anatomy Route 7, Box 15
 Route 4, Box 51
 State Side Road
 Chapel Hill, N. C.
- Sandra M. Cypess (1967), M.A. (Cornell)
Visiting Assistant Professor of
Romance Languages
- Frank P. Dalton (1968), M.D. (Duke)
Associate in Community Health Sciences 506 Morreene Road
- Thaddeus George Dankel, Jr. (1968), M.A. (Princeton)
Assistant Professor of Mathematics 11-B Princeton Apartments
- *Sabbatical leave spring 1968-69; fall 1969-70.
 †Through 8-31-69.
 ‡Sabbatical leave 10-1-68 through 3-31-69.
 ||Deceased 10-14-69.

- *Nancy G. Davenport (1969)
Instructor in the School of Nursing
- Ollie B. Davenport (1961), M.S.N. (Western Reserve)
Assistant Professor of Nursing 905 West Knox Street
- David George Davies (1961), Ph.D. (California)
Professor of Economics 2631 McDowell Street
- William David Davies (1966), D.D. (Wales)
*George Washington Ivey Professor of Advanced Studies and
 Research in Christian Origins* 228 Monticello Road
- Calvin D. Davis (1962), Ph.D. (Indiana)
Associate Professor of History Apartment 18, Alastair Court
- Gifford Davis (1930), Ph.D. (Harvard)
Professor of Romance Languages 2248 Cranford Road
- J. A. Davis (1968), Ph.D. (Columbia)
Adjunct Professor of Education and Lecturer in Psychology 405 Holly Lane
 Chapel Hill, N. C.
- Luey T. Davis (1969), Ed.D. (Columbia)
*Adjunct Associate Professor of Education and
 Clinical Associate in Therapeutic Education* 223 Hillcrest Circle
 Chapel Hill, N. C.
- Morris Davis (1966), Ph.D. (Yale)
Adjunct Professor of Mathematics and Physics 404 Estes Drive
 Chapel Hill, N. C.
- Otho L. Davis (1965), M.A. (Kent State)
Assistant Professor of Physical Education 214 Landsbury Street
- †Eugene Davis Day (1962), Ph.D. (Delaware)
*Professor of Immunology and
 Professor of Experimental Surgery* 2727 McDowell Street
- John Essary Dees (1939), M.D. (Virginia)
Professor of Urology 413 Carolina Circle
- Susan Coons Dees (1939), M.D. (Johns Hopkins)
Professor of Pediatrics 413 Carolina Circle
- David C. Dellinger (1968), Ph.D. (Stanford)
Associate Professor of Management Sciences 19 Heath Place
- Walter E. Dellinger, III (1969), LL.B. (Yale)
Associate Professor of Law 2304 Hillandale
- William J. DeMaria (1951), M.D. (Duke)
*Professor of Community Health Sciences and
 Associate Professor of Pediatrics* 1126 Woodburn Road
- Catherine E. Dennis (1969), CAGS (Boston Univ.)
Instructor in Nursing Room 278, Duke Motor Lodge
- Sara Jamison Dent (1965), M.D. (South Carolina)
Professor of Anesthesiology Route 1, Box 30
 Hillsborough, N. C.
- A. Leigh De Neef (1969), Ph.D. (Pennsylvania State)
Assistant Professor of English Apt. 28, 2009 Southwood Drive
- Mary Denyes (1967), M.S. (Wisconsin)
Assistant Professor in Nursing Apartment D-14
 2112 Broad Street
- Gretchen J. Dery (1969), M.S. (Catholic Univ.)
Instructor in Nursing 2836 Chapel Hill Road
- †Lydia Ann deSantis (1968), M.N.E. (Pittsburgh)
Instructor in Nursing 4216 Garrett Road
- John C. Detwiler (1966), Th.M. (Duke)
Instructor in Pastoral Care 136 Brenrose Circle
- *2-1-69 through 6-1-69.
 †Sabbatical leave 9-1-70 through 2-28-71.
 ‡Leave of absence 1969-70.

- †Frank Traver de Vyver (1935), Ph.D. (Princeton)
Professor of Economics 8 Sylvan Road
- Irving Diamond (1958), Ph.D. (Chicago)
Professor of Psychology 2745 McDowell Street
- Joseph Di Bona (1967), Ph.D. (California)
Associate Professor of Education 1123 Woodburn Road
- Luca Di Cecco (1966), M.M. (Indiana)
Assistant Professor of Music 5418 Beaumont Drive
- Macdonald Dick (1932), M.D. (Johns Hopkins)
Assistant Professor of Physiology and Pharmacology
and Associate in Medicine 3005 Norwich Way
- †Robert L. Dickens (1949), M.S. (North Carolina), C.P.A., LL.D.
Professor of Accounting in the Department of
Management Sciences 2717 Circle Drive
- Marcus L. Dillon (1957), M.D. (Duke)
Associate Professor of Surgery 1005 Minerva Avenue
- Carlos Doggenweiler (1968), Ph.D. (Catolica)
Visiting Lecturer in Anatomy 16-F Valley Terrace Apartments
- §George W. Doss (1968), M.D. (Texas)
Associate in Psychiatry (Highland Hospital) 382 Montford Avenue
 Asheville, N. C.
- Neal Dow (1934), Ph.D. (Pennsylvania)
Professor of Romance Languages 2252 Cranford Road
- Anthony R. Dowell (1969), M.D. (Indiana)
Assistant Professor of Medicine 2823 Ridge Road
- Roger W. Doyle (1967), Ph.D. (Yale)
Assistant Professor of Zoology Apartment 4
 914 Monmouth Avenue
- Francis George Dressel (1929), Ph.D. (Duke)
Professor of Mathematics 2502 Francis Street
- Chancellor Driscoll (1969), M.S.S.W. (Louisville)
Associate in Psychiatric Social Work 1412 Vickers Avenue
- Bernard I. Duffey (1963), Ph.D. (Ohio State)
Professor of English 2732 Dogwood Drive
- Kenneth Lindsay Duke (1940), Ph.D. (Duke)
Associate Professor of Anatomy 2736 McDowell Street
- Patrick Peter Dunn (1969), Ph.D. (Duke)
Visiting Assistant Professor of History 2216 Elba Street
- ||Robert F. Durden (1952), Ph.D. (Princeton)
Professor of History 2532 Wrightwood Avenue
- Jiri Dvorak (1967), Cand. of Science (Czechoslava Academy of Sciences)
Assistant Professor of Civil Engineering 2956 Friendship Drive
- Thomas G. Dzubay (1969), Ph.D. (Minnesota)
Assistant Professor of Physics 408 Swift Avenue
- Paul H. Earls (1959), Ph.D. (Rochester)
Associate Professor of Music 1509 Hollywood Street
- Paul A. Ebert (1966), M.D. (Ohio State)
Associate Professor of Surgery 4004 Bristol Road
- Ruth Buchanan Eddy (1952), M.S. (Smith)
Associate Professor of Physical Education 702 Louise Circle
- °°Thomas A. Edmonds (1968), LL.B. (Duke)
Visiting Associate Professor of Law 3408 Dover Road

†Sabbatical leave fall semester 1969-70.

‡Sabbatical leave 1969-70.

§Through 9-30-69.

||Leave of absence 1970-71.

°°Through 8-31-69.

- James Michael Efrid (1962), Ph.D. (Duke)
Associate Professor of Biblical Languages and Interpretation Route 7, Box 211, Piney Mt. Road
- ‡Carl Eisdorfer (1958), Ph.D. (New York)
Professor of Medical Psychology and Professor of Psychiatry 3423 Hope Valley Road
- Jane G. Elchlepp (1960), M.D. (Iowa), Ph.D. (Chicago)
Associate Professor of Pathology and Assistant to Vice President for Health Affairs, Planning and Analysis Route 1, Cornwallis Road
- Howard L. Elford (1969), Ph.D. (Cornell)
Assistant Professor of Experimental Medicine 18 Balmoray Court
 Yorktowne Apartments
- Everett H. Ellinwood (1966), M.D. (North Carolina)
Assistant Professor of Psychiatry 3519 Tonbridge Way
- Ernest Elsevier (1950), M.S.M.E. (Georgia Institute of Technology)
Associate Professor of Mechanical Engineering 2412 Wrightwood Avenue
- Ainslie T. Embree (1969), Ph.D. (Columbia)
Professor of History 1611 Duke University Road, Apartment 5B
- Max D. Engelhart (1966), Ph.D. (Illinois)
Lecturer in Education 2419 Perkins Road
- Leon M. Ennis, Jr. (1969), Ph.D. (North Carolina)
Visiting Assistant Professor of Management Sciences 40 Flemington Road
 Chapel Hill, N. C.
- Carl Erickson (1966), Ph.D. (Rutgers)
Assistant Professor of Psychology 106 Newell Street
- Robert P. Erickson (1961), Ph.D. (Brown)
Associate Professor of Psychology 2061 Tanglewood Drive
- Charles W. Erwin, (1969), M.D. (Texas)
Associate Professor of Psychiatry 2708 Sevier Street
- E. Harvey Estes, Jr. (1953), M.D. (Emory)
Professor of Medicine and Professor of Community Health Sciences 3542 Hamstead Court
- John C. Evans (1967), M.D. (Michigan)
Professor of Radiology Route 2, Piney Mt. Road
 Chapel Hill, N. C.
- Lawrence E. Evans (1963), Ph.D. (Johns Hopkins)
Associate Professor of Physics 1020 Demerius Street
- John Wendell Everett (1932), Ph.D. (Yale)
Professor of Anatomy 1105 Woodburn Road
- Robinson Oscar Everett (1956), LL.M. (Duke)
Professor of Law 601-13A La Salle Street
- Katherine C. Ewel (1969), A.B. (Cornell)
Temporary Instructor of Zoology Box 142, Route #1
- Henry A. Fairbank (1962), Ph.D. (Yale)
Professor of Physics 1515 Pinecrest Road
- Carmen M. Falcone (1946), M.A. (Ohio State)
Professor of Physical Education 1402 Woodburn Road
- Donn Michael Farris (1959), B.D., M.S. in L.S. (Columbia)
Associate Professor of Theological Bibliography 921 Buchanan Boulevard
- Ben W. Feather (1963), Ph.D. (Duke)
Assistant Professor of Psychiatry and Lecturer in Psychology 3300 East Oak Street
- Roberta Feather (1965), M.S.N.E. (North Carolina)
Assistant Professor of Nursing 3300 East Oak Street
- Robert A. Federchuck (1969), A.B. (Syracuse)
Associate in Physical Therapy 2209 Elmwood Avenue
- ‡Sabbatical leave 1969-70.

- °Andrew Feenberg (1968), M.A. (California at San Diego) Route 1, Box 117A
Assistant Professor of Philosophy Pittsboro, N. C.
- John Morton Fein (1950), Ph.D. (Harvard)
Professor of Romance Languages 2726 Montgomery Street
- Jerome Feldman (1968), M.D. (Northwestern)
Associate in Medicine 1609 Hollywood Street
- Robert E. Fellows (1966), M.D. (McGill)
Assistant Professor of Physiology and Assistant Professor of Medicine 3106 Ridge Road
- Arthur Bowles Ferguson (1939), Ph.D. (Cornell)
Professor of History 22 Lebanon Circle
- Oliver W. Ferguson (1957), Ph.D. (Illinois)
Professor of English 1212 Arnette Avenue
- Bernard F. Fetter (1951), M.D. (Duke)
Professor of Pathology 3836 Somerset Drive
- °Michael Finger (1965), Ph.D. (North Carolina)
Assistant Professor of Economics Apartment 41
1000 N. Duke Street
- Peter G. Fish (1969), Ph.D. (Johns Hopkins)
Assistant Professor of Political Science Apartment 46
1000 N. Duke Street
- Walter L. Floyd (1959), M.D. (Johns Hopkins)
Associate Professor of Medicine 3556 Hamstead Court
- Donald J. Fluke (1958), Ph.D. (Yale)
Professor of Zoology 2703 Sevier Street
- Lloyd R. Fortney (1964), Ph.D. (Wisconsin)
Assistant Professor of Physics Apartment G2
1200 Leon Street
- Sidney R. Fortney (1968), M.D. (Duke)
Associate in Medicine Apartment 22J, Valley Terrace
- Ellen Gwendolyn Fortune (1964), M.A. (Western Reserve)
Associate Professor of Nursing 5203 Shady Bluff Road
- †Marianka Fousek (1965), Ph.D. (Harvard)
Assistant Professor of Religion 2722 Erwin Road
- Donald R. Fowler (1967), M.D. (Southwestern Medical School of Texas)
Assistant Professor of Psychiatry Route 5, Box 564
- Earle Cabell Fowler (1962), Ph.D. (Harvard)
Professor of Physics 1821 Lake Shore Drive
Chapel Hill, N. C.
- John Alvis Fowler (1953), M.D. (Bowman Gray)
Professor of Psychiatry and
Assistant Professor of Pediatrics 1514 Edgevale Road
- Wallace Fowlie (1964), Ph.D. (Harvard)
James B. Duke Professor of Romance Languages Apartment 17 D
Valley Terrace Apartments
- †James Fox (1968), D.Phil. (Oxon.)
Visiting Assistant Professor of Sociology
and Anthropology 1635 Greenbriar Road
- Richard Fox (1968), Ph.D. (Michigan)
Associate Professor of Anthropology 124 W. Queen Street
Hillsborough, N. C.
- Robert C. Frasure, M.A. (1969) (London)
Temporary Instructor of Political Science 1406-A, Duke University Road
- Charles H. Frenzel (1956), B.A. (Duke)
Professor of Hospital Administration 3950 Bristol Road
- Irwin Fridovich (1958), Ph.D. (Duke)
Associate Professor of Biochemistry 3517 Courtland Drive

°Through 8-31-69.

†Through 8-31-69.

‡Through 8-31-69.

- John A. Friedrich (1963), Ph.D. (Michigan State)
Professor of Physical Education 2953 Welcome Drive
 William J. Furbish (1954), M.S. (Wisconsin) Route 2
Associate Professor of Geology Hillsborough, N. C.
- Mercedes Gaffron (1958), Ph.D. (Berlin), M.D. (Munich)
Associate Research Professor of Psychology 1612 Maryland Avenue
- Johnnie L. Gallemore, Jr. (1969), M.D. (Emory)
Associate in Psychiatry Box 70, Route 7
- Thomas Muir Gallie, Jr. (1954), Ph.D. (Rice)
Professor of Mathematics and
Professor of Biomathematics 2740 Montgomery Street
- John T. Garbutt (1969), M.D. (Temple)
Associate in Medicine 2213 Prince Street
- Ila H. Gehman (1959), Ed.D. (Pennsylvania State)
Associate Professor of Medical Psychology in
Department of Psychiatry and Lecturer in Psychology 2703 Spencer Street
- W. Scott Gehman, Jr. (1954), Ph.D. (Pennsylvania State)
Professor of Psychology in Education 2703 Spencer Street
- John A. Gehweiler (1967), M.D. (Duke)
Assistant Professor in Radiology 3551 Hamstead Court
- Ernest A. E. Gellhorn (1966), LL.B. (Minnesota)
Professor of Law 2517 Wrightwood Avenue
- Wm. D. Gentry (1969), Ph.D. (Florida State)
Assistant Professor of Medical Psychology 1100 Leon Street
 Apartment 9
- Rhett Truesdale George, Jr. (1957) Ph.D. (Florida)
Assistant Professor of Electrical Engineering 3803 Tremont Drive
- Nicholas G. Georgiade (1951), D.D.S., M.D. (Duke)
Professor of Plastic Maxillofacial and Oral Surgery 2523 Wrightwood Avenue
- Carl J. Gerber (1963), Ph.D. (Washington)
Assistant Professor of Neurology and Associate in Physiology 116 Montclair
- Gerald E. Gerber (1962), Ph.D. (Northwestern)
Assistant Professor of English 2602 Francis Street
 Route 1, Box 200
- Barbara B. Germino (1965), B.S.N. (Duke)
Assistant Professor in Nursing Murphy School Road
- Robert George Chirardelli (1962), Ph.D. (California Institute of Technology)
Visiting Assistant Professor of Chemistry 1404 Anderson Street
- Daniel T. Gianturco (1966), M.D. (Buffalo)
Assistant Professor of Psychiatry 2925 Friendship Road
- Robert H. Gibbs (1964), M.D. (Duke)
Assistant Professor of Medicine 2650 University Road
- Nicholas W. Gillham (1968), Ph.D. (Harvard)
Associate Professor of Zoology 1211 Woodburn Road
- *S. Malcolm Gillis (1967), Ph.D. (Illinois)
Assistant Professor of Economics 69-C Colonial Apartments
- Fred L. Ginn (1968), M.D. (Duke)
Assistant Professor in Pathology 2602 Broad Street
- B. Z. Ginsburg (1969), Ph.D. (Hebrew Univ.)
Visiting Professor of Physiology and Pharmacology 2101 W. Club Boulevard
- Donald E. Ginter (1963), Ph.D. (California at Berkeley)
Associate Professor of History 1918 Dartmouth Drive
- Balthasar Gisin (1969), Ph.D. (Univ. of Basel)
Assistant Professor of Physiology The Rockefeller University
 New York, New York
- John G. Giragos (1968), M.D. (American Univ. Medical School, Beirut, Lebanon)
Assistant Professor of Psychiatry 28-E Valley Terrace Apartments

*Through 8-31-69.

- Sherwood Githens, Jr. (1962), Ph.D. (North Carolina)
Professor of Education 4427 Chapel Hill Road
- James F. Glenn (1963), M.D. (Duke)
Professor of Urology 27 Oak Drive
- Clarence Gohdes (1930), Ph.D. (Columbia)
James B. Duke Professor of English 2737 Circle Drive
- Joseph Leonard Goldner (1950), M.D. (Nebraska)
Professor of Orthopaedic Surgery 602 East Forest Hills Boulevard
- Leonard J. Goldwater (1968), M.D. (New York Univ.)
Visiting Scholar in the Department of Community Health Sciences Route 3, Box 50, Chapel Hill, N. C.
- Richard A. Goodling (1959), Ph.D. (Pennsylvania State)
Professor of Pastoral Psychology Route 7, Box 308, Farrington Road
- Jack K. Goodrich (1965), M.D. (Tennessee)
Associate Professor of Radiology 2940 Welcome Drive
- Craufurd D. Goodwin (1962), Ph.D. (Duke)
Professor of Economics 2256 Cranford Road
- Walter Gordy (1946), Ph.D. (North Carolina), LL.D.
James B. Duke Professor of Physics 2521 Perkins Road
- John A. Goree (1959), M.D. (Duke)
Associate Professor of Radiology Route 7, Box 223A
- Ralph J. Gorten (1963), M.D. (Pennsylvania)
Assistant Professor of Medicine and Assistant Professor of Radiology 2436 Tryon Road
- *Virginia Gover (1960), M.S.N. (Boston College)
Assistant Professor of Nursing 2722 Brown Avenue
- Daniel A. Graham (1969), Ph.D. (Duke)
Assistant Professor of Economics 5314 Shady Bluff
- †James D. Graham (1967), Ph.D. (Northwestern)
Assistant Professor of History 1713 James Street
- Thomas P. Graham, Jr. (1969), M.D. (Duke)
Assistant Professor of Pediatrics and Assistant Professor of Medicine (Neurology) 3413 Rolling Hill Road
- Richard Babson Grant (1952), Ph.D. (Harvard)
Professor of Romance Languages 2509 Wrightwood Avenue
- Pauline Gratz (1969), B.A. (Columbia)
Professor of Nursing 220 Dacian Avenue
- Fred Q. Graybeal (1968), M.D. (Duke)
Assistant Professor in Pathology 3022 Chapel Hill Road
- Robert Lee Green, Jr. (1960), M.D. (Hahnemann)
Associate Professor of Psychiatry 3700 Hermine Street
- Ronald C. Greene (1958), Ph.D. (California Institute of Technology)
Assistant Professor of Biochemistry 1014 Norwood Avenue
- Joseph C. Greenfield (1962), M.D. (Emory)
Associate Professor of Medicine and Assistant Professor of Physiology 1212 Virginia Avenue
- John R. Gregg (1957), Ph.D. (Princeton)
Professor of Zoology 3702 Randolph Road
- Robert A. Gregg (1961), M.D. (South Carolina)
Associate Professor of Physical Medicine 2747 Sevier Street
- Eugene Greuling (1948), Ph.D. (Indiana)
Professor of Physics 2414 Perkins Road

*Leave of absence 1969-70.

†Through 8-31-69.

- John Francis Griffith (1969), M.D. (Saskatchewan Univ., Canada)
Assistant Professor of Pediatrics and Neurology 917 Murray Avenue
- Keith Sanford Grimson (1930-42; 1945), M.D. (Rush)
Professor of Surgery 3313 Devon Road
- *Egil Crislis (1959), B.D., Ph.D. (Yale)
Associate Professor of Historical Theology 2323 Englewood Avenue
- †Samson R. Gross (1960), Ph.D. (Columbia)
Professor of Genetics and Biochemistry 2411 Prince Street
- ‡Roderick L. Guerry, Jr. (1968), M.D. (Medical College of Georgia)
Associate in Pathology 109 Newell Street
- Walter R. Guild (1960), Ph.D. (Yale)
Professor of Biophysics 2625 McDowell Street
- J. Caulie Gunnells (1962), M.D. (South Carolina)
Associate Professor of Medicine 3317 Devon Road
- John Gutknecht (1969), Ph.D. (North Carolina)
Assistant Professor of Physiology 2506 Nation Avenue
- §Jordan U. Gutterman (1968), M.D. (Medical College of Virginia)
Associate in Medicine 44 B Colonial Apartments
- Norman Guttman (1951), Ph.D. (Indiana)
Professor of Psychology 201 Woodridge Drive
- ||Robert A. Guyer (1964), Ph.D. (Cornell)
Assistant Professor of Physics
- Robert Lee Habig (1968), Ph.D. (Purdue)
Associate in Biochemistry 115 Bennett Court
- Donald B. Hackel (1960), M.D. (Harvard)
Professor of Pathology 4018 Bristol Road
- Herbert Hacker, Jr. (1965), Ph.D. (Michigan)
Associate Professor of Electrical Engineering 2739 Montgomery Street
- Ellis P. Hagler (1936)
Instructor in Physical Education 1715 Cornwallis Road
- Dwight Hubert Hall (1968), Ph.D. (Purdue)
Assistant Professor of Biochemistry 3816 Hillgrand Drive
- Hugh Marshall Hall (1952), Ph.D. (Texas)
Professor of Political Science 2413 Wrightwood Avenue
- *Jack R. Hall (1965), M.A. (Georgia)
Assistant Professor of Physical Education 3329 Rolling Hill Road
- Kenneth D. Hall (1958), M.D. (Duke)
Professor of Anesthesiology 2715 Montgomery Street
- Louise Hall (1931), Ph.D. (Radcliffe)
Professor of Architecture Box 6636, College Station
- Thor Hall (1962), Ph.D., B.D. (Duke)
Associate Professor of Preaching and Theology 3537 Hamstead Court
- John Hamilton Hallowell (1942), Ph.D. (Princeton)
Professor of Political Science 3606 Darwin Road
- Iain Hamilton (1962), B.M. (London)
Mary Duke Biddle Professor of Music Erwin Apartments
 Buchanan Boulevard
- William Baskerville Hamilton (1936), Ph.D. (Duke)
Professor of History 300 Swift Avenue
 Alastair Court Apartments

*Through 8-31-69.

†Leave of absence 1969-70.

‡Through 6-30-69.

§Through 7-31-69.

||Through 8-31-69.

*°Through 7-31-69.

- Charles B. Hammond (1968), M.D. (Duke)
Assistant Professor in Obstetrics and Gynecology 3521 Mossdale Avenue
- William E. Hammond (1968), Ph.D. (Duke)
Assistant Professor of Community Health Sciences 10 Forrestdale Drive
- Moo Young Han (1967), Ph.D. (Rochester)
Assistant Professor of Physics Apartment E-2, 1200 Leon Street
- *Philip Handler (1939), Ph.D. (Illinois)
James B. Duke Professor of Biochemistry and Nutrition 2529 Perkins Road
- John Kennedy Hanks (1954), M.A. (Columbia)
Professor of Music and Lecturer in Church Music 1810 Glendale Avenue
- †Frank Allan Hanna (1948), Ph.D. (Wisconsin)
Professor of Economics 2239 Cranford Road
- ||Oscar Carl Edvard Hansen-Prüss (1930), M.D. (Johns Hopkins)
Professor of Medicine 3303 Surrey Road
- Elizabeth B. Harkins (1968), M.S.W. (Pittsburgh)
Associate in Psychiatry 6 Buena Vista Road
 Asheville, N. C.
- Thomas S. Harle (1969), M.D. (Northwestern)
Associate Professor of Radiology 2330 Hilton Avenue, Apartment 3
- Charles M. Harman (1961), Ph.D. (Wisconsin)
Associate Professor of Mechanical Engineering 2620 McDowell Street
- Ellwood Scott Harrar (1936), Ph.D. (Syracuse), Sc.D.
James B. Duke Professor of Wood Science 2228 Cranford Road
- Philip D. Harriman (1968), Ph.D. (California at Berkeley)
Assistant Professor of Biochemistry 2212 Myers Street
- Cecil Craig Harris (1967), M.S. (Tennessee)
Assistant Professor of Medical Electronics 2910 Welcome Drive
- Harold Joseph Harris (1960), M.D. (Long Island College of Medicine)
Associate Professor of Psychiatry and
Assistant Professor of Pediatrics 1702 N. Roxboro Road
- Jerome Sylvan Harris (1936), M.D. (Harvard)
J. Buren Sidbury Professor of Pediatrics
and Associate Professor of Biochemistry 2907 Hope Valley Road
- †James E. Hart (1966), A.B. (Harvard)
Assistant Professor of Political Science 500 Watts Street
- Robert B. Hartford (1968), M.A. (Georgia)
Assistant Professor of Sociology and Anthropology 540 Green Street
- Michael J. Hartley (1968), B.A. (Carleton)
Assistant Professor of Economics 76-D Colonial Apts.
- Ingrid U. Hartwig (1969), B.A. (Wirtschaftschule, Germany)
Temporary Instructor of German 2112 Broad Street
- William John Harvey (1961), B.S. (Appalachian)
Assistant Professor of Physical Education Route 2, Russell Road
- George Corbin Harwell (1935), Ph.D. (Duke)
Associate Professor of English 2115 Wilson Street
- **Charles Roy Hauser (1929), Ph.D. (Iowa)
James B. Duke Professor of Chemistry 1020 Rosehill Avenue
- §Clark C. Havighurst (1964), J.D. (Northwestern)
Professor of Law 3610 Dover Road

*Leave of absence 7-1-69 through 6-30-74.

†Sabbatical leave fall semester 1969-70.

||Deceased 1-26-70.

‡Through 8-31-69.

**Deceased 1-6-70.

§Leave of absence spring semester 1969-70.

- Thomas Havrilesky (1969), Ph.D. (Illinois)
Associate Professor of Economics 14C 200 Seven Oaks
- Arthur Hawley (1969), Ph.D. (Michigan)
Visiting Assistant Professor of Economics 522 Hooper Lane
 Chapel Hill, N. C.
- *Charles P. Hayes (1964), M.D. (Duke)
Assistant Professor of Medicine 3820 Hillgrand Circle
- †John James Hayes (1968), M.H.A. (Washington Univ.)
Assistant Professor of Community Health Services 13-C Colonial Apartments
- William S. Hecksher (1966), Ph.D. (Hamburg)
Benjamin N. Duke Professor of Art P. O. Box 6605
 College Station
- Peter L. Hein (1963), M.D. (Georgetown)
Associate Professor of Psychiatry 2511 Perkins Road
- Henry Hellmers (1965), Ph.D. (California)
Professor of Botany and Professor of Forestry 1646 Marion Avenue
- Carl Helvie (1969), Ph.D. (Johns Hopkins)
Associate Professor of Nursing Howard Lane, Route 7, Box 72
- †Alan S. Henderson
Visiting Professor of Zoology
- James Paisley Hendrix (1938), M.D. (Pennsylvania)
Professor of Medicine and Therapeutics 144 Pinecrest Road
- Robert W. Henkens (1968), Ph.D. (Yale)
Assistant Professor of Chemistry 2116 Pershing Street
- James Donald Henry (1960), M.M. (Indiana)
Assistant Professor of Music 311 W. Delafield Street
- Paul B. Henry (1969), M.A. (Duke)
Temporary Instructor of Political Science 86-A Colonial Apartments
- Stuart C. Henry (1959), B.D., Ph.D. (Duke)
Professor of American Christianity K-1-A University Apartments
- C. Ward Henson (1967), Ph.D. (Massachusetts Institute of Technology)
Assistant Professor of Mathematics 1702 Vista Street
- Stephen Duncan Heron, Jr. (1950), Ph.D. (North Carolina)
Associate Professor of Geology Route 1, Box 92
- David G. Herr (1967), Ph.D. (North Carolina)
Assistant Professor of Mathematics 3112 Camelot Street
- Barton R. Herrscher (1969), Ed.D. (Duke)
Adjunct Assistant Professor of Education 3502 Randolph Road
- Stephen Hersey (1969), Ph.D. (Duke)
Assistant Professor of Physiology 123 Newell Street
- Frederick L. Herzog (1960), Th.D. (Princeton)
Professor of Systematic Theology 2936 Chapel Hill Road
- §Julia G. Hester (1965), M.S. (North Carolina)
Assistant Professor of Nursing Colonial Apartments, 7 D
- Thomas T. Hetherington (1969), M.D. (Pennsylvania)
Associate in Radiology 2312 Anthony Drive
- Siegfried Heyden (1966), M.D. (Berlin)
Associate Professor of Community Health Sciences 1407 Arnette Avenue
- Albert Heyman (1953), M.D. (Maryland)
Professor of Medicine 1216 Woodburn Road
- Jacqueline Hijmans (1965), M.D. (State University, Leyden, Holland)
Associate in Medicine 2907 Hope Valley Road

*Through 5-7-69.

†Through 2-28-69.

‡From 7-1-69 through 7-30-69.

§Leave of absence 7-1-69 through 7-1-71.

- †David W. Hill (1962), Ph.D. (Stanford)
Associate Professor of Engineering Mechanics in
Department of Civil Engineering Apartment D-9
 Croasdaile Apartments
 4300 W. Galax Drive
 Raleigh, N. C.
- Gale B. Hill (1967), Ph.D. (Duke)
Associate in Radiology
- Robert L. Hill (1961), Ph.D. (Kansas)
Professor of Biochemistry and Chairman
of the Department of Biochemistry 2510 Perkins Avenue
- Hans J. Hillerbrand (1959), Ph.D. (Erlangen)
Professor of Modern Church History
and Professor of History 2729 Sevier Street
- Brian Andrew Hills (1968), Ph.D. (Adelaide)
Associate Professor of Experimental Surgery and
Associate Professor of Biomedical Engineering 2750 McDowell
- Frederick R. Hine (1958), M.D. (Yale)
Associate Professor of Psychiatry 2317 Prince Street
- Richard D. Hobbett (1968), J.D. (Iowa)
Professor of Law 1808 Chapel Hill Road
- Marcus Edwin Hobbs (1935), Ph.D. (Duke)
Professor of Chemistry 115 Pinecrest Road
- †Paul E. Hochstein (1963), Ph.D. (Maryland)
Associate Professor of Pharmacology 2717 Spencer Street
- Richard Earl Hodel (1965), Ph.D. (Duke)
Assistant Professor of Mathematics Colonial Apartments
- Charles S. Hodges, Jr. (1963), Ph.D. (Georgia)
Adjunct Associate Professor of Forest Pathology 2012 Nancy Ann Drive
 Raleigh, N. C.
- Charlotte Hogsett (1965), Ph.D. (Harvard)
Assistant Professor of Romance Languages 427 Green Street
- Carol Clarke Hogue (1963), M.S.N. (Duke)
Assistant Professor of Nursing 2913 Welcome Drive
- Irving Brinton Holley, Jr. (1947), Ph.D. (Yale)
Professor of History 2506 Wrightwood Avenue
- §Peter W. Holloway (1967), Ph.D. (Manchester Univ.)
Associate in Biochemistry Morreene Manor, Apt. H2
- Frederic B. M. Hollyday (1956), Ph.D. (Duke)
Associate Professor of History 1824 Forest Road
- Frances Virginia Lee Holton (1947), M.A. (Texas State)
Associate Professor of Physical Education 407 Erwin Apartments
- *Everett Harold Hopkins (1961), A.M. (Pennsylvania) LL.D.
Professor of Education 1520 Pinecrest Road
- ||Edward Charles Horn (1946), Ph.D. (Princeton), ScD.
Professor of Zoology 818 East Forest Hills Boulevard
- **Paul Horowicz (1961), Ph.D. (Johns Hopkins)
Associate Professor of Physiology 216 West Woodridge Drive
- Grace C. Horton (1969), B.S. (Albright)
Associate in Physical Therapy 8 Greenfield Court
- Theresa Elizabeth Horton (1964), M.S.N.E. (Pittsburgh)
Assistant Professor of Nursing Apartment 3
 810 Clarendon Street

*Leave of absence 6-1-67 through 1-31-70.

†Sabbatical leave spring semester 1968-69.

‡Through 9-30-69.

§Through 8-31-69.

||Deceased 11-18-69.

**Through 6-30-69.

- Dennis Robert Howard (1968), M.D. (Wisconsin)
Assistant Professor of Community Health Sciences 5502 Beaumont Drive
- †Betty Lee Hubbard (1967), Ph.D. (North Carolina)
Associate in Psychiatry 35 Hamilton Road, Chapel Hill, N. C.
- William R. Hudson (1961), M.D. (Bowman Gray)
Professor of Otolaryngology 504 Compton Place
- Thomas A. Huff (1968), M.D. (Emory)
Associate in Medicine 2504 Vineyard Street
- §George M. Hughes (1969), Ph.D. (Cambridge)
Visiting Professor of Zoology 1911 House Avenue, Apartment 32A
- Alexander Hull (1962), Ph.D. (Washington)
Associate Professor of Romance Languages 2318 Prince Street
- Wanda Sanborn Hunter (1947), Ph.D. (California)
Associate Professor of Zoology 216 Ann Street
 Beaufort, N. C.
- Allan S. Hurlburt (1956), Ph.D. (Cornell)
Professor of Education 112 Buchanan Boulevard
- Mary Martin Huse (1959), Ph.D. (Duke)
*Assistant Professor of Medical Psychology in Department of Psychiatry
 and Lecturer in Psychology* Route 7, Box 270, Ephesus Church Road
- O. Kelly Ingram (1959), B.D. (Duke)
Professor of Parish Ministry and Director of Field Education 2728 Sevier Street
- *Sheldon Isenberg (1968), M.A. (Harvard)
Assistant Professor of Religion 5 C Anderson Street Apartments
- Jacquelyne J. Jackson (1968), Ph.D. (Ohio State)
*Assistant Professor of Medical Sociology in
 Department of Psychiatry* 2910 Kanewood Drive
 Apartment 44
- †Robert M. Jackson (1968), Ph.D. (Harvard)
Assistant Professor of Romance Languages 1000 N. Duke Street
- Wallace Jackson (1965), Ph.D. (Pennsylvania)
Assistant Professor of English 1006 West Knox Street
- Ann Madeline Jacobansky (1953), M.Ed. (Pittsburgh)
Professor of Nursing 1200 Leon Street, Apt. H-8
 Apartment D-14
- Miriam J. Jacobs (1968), Ph.D. (Alabama)
Assistant Professor of Anatomy 1829 Front Street
- M. M. Jarmakani (1969), M.D. (Damascus)
Assistant Professor of Pediatrics C-3B University Apartments
- Peter Walter Jeffs (1964), Ph.D. (Natal)
Associate Professor of Chemistry 3209 Cromwell Road
- Marianna Duncan Jenkins (1948), Ph.D. (Byrn Mawr)
Associate Professor of Art 1000 N. Duke Street
- Alan W. Jenks (1966), Th.D. (Harvard)
Assistant Professor of Religion 2904 Herring Boulevard
- Paul H. Jewett (1969), M.D. (Stanford)
Associate in Pediatrics 3414 Angus Road
- Bronislas de Leval Jezierski (1958), Ph.D. (Harvard)
Associate Professor of Slavic Literatures 1101 Norwood Avenue
- John P. Jiminez (1965), M.D. (Medical College of Virginia)
Assistant Professor of Radiology 1604 Woodburn Road
- Frans F. Jöbsis (1964), Ph.D. (Michigan)
Professor of Physiology 1542 Hermitage Court

*Through 8-31-69.

†Through 8-31-69.

‡Through 5-22-69.

§From 2-1-69 through 4-30-69.

Frederick Charles Joerg (1947), M.B.A. (Harvard) <i>Professor of Management Sciences and Professor of Forest Management</i>	2424 Wrightwood Avenue
Charles B. Johnson (1956), Ed.D. (Duke) <i>Associate Professor of Education</i>	2714 McDowell Street
Dale T. Johnson (1967), Ph.D. (Vanderbilt) <i>Assistant Professor of Psychiatry</i>	108 Biltmore Garden Apartments Asheville, N. C.
Edward Anthony Johnson (1963), M.D. (Sheffield) <i>Professor of Physiology and Pharmacology</i>	1408 Shepherd Street
Joseph Johnson (1967), Ed.D. (Virginia) <i>Associate Professor of Education</i>	3411 Mossdale
Raleigh F. Johnson, Jr. (1969), Ph.D. (Purdue) <i>Associate in Radiology</i>	Colonial Apartments 27-B
Terry Walter Johnson, Jr. (1954), Ph.D. (Michigan) <i>Professor of Botany</i>	2408 Prince Street
Irwin Johnsrude (1966), M.D. (Manitoba) <i>Associate Professor of Radiology</i>	2702 Spencer Street
*John Devereaux Johnston (1962), LL.B. (Duke) <i>Professor of Law</i>	2810 Chelsea Circle
William Webb Johnston (1963), M.D. (Duke) <i>Assistant Professor of Pathology</i>	1608 University Drive
William T. Joines (1966), Ph.D. (Duke) <i>Associate Professor of Electrical Engineering</i>	4010 Deepwood Circle
Wolfgang Karl Joklik (1968), Ph.D. (Oxford) <i>Professor of Microbiology and Immunology</i>	3613 Hathaway Road
Barney L. Jones (1956), B.D., Ph.D. (Duke) <i>Associate Professor of Religion</i>	2622 Pickett Road
Buford Jones (1962), Ph.D. (Harvard) <i>Associate Professor of English</i>	908 West Markham Avenue
Edward Ellsworth Jones (1953), Ph.D. (Harvard) <i>Professor of Psychology</i>	2738 Sevier Street
James David Jones (1963), M.D. (Duke) <i>Assistant Professor of Psychiatry and Associate in Pediatrics</i>	3851 Somerset Drive
Jayant G. Joshi (1966), Ph.D. (India) <i>Assistant Professor of Biochemistry</i>	2003 Ward Street
*Joan Elizabeth Kahle (1968), M.S. (Indiana) <i>Instructor in Physical Education</i>	1301 L Leon Street
Helen Louise Kaiser (1943), R.P.T. (Harvard) <i>Professor of Physical Therapy</i>	1201 Dwire Place
William Arthur Kale (1952), B.D., D.D. (Duke) <i>Professor of Christian Education</i>	500 East Markham Avenue
William C. Kalke (1968), M.A. (Princeton) <i>Assistant Professor of Philosophy</i>	2116 Englewood
Henry Kamin (1948), Ph.D. (Duke) <i>Professor of Biochemistry</i>	2417 Perkins Road
†Julian Norman Kanfer (1968), Ph.D. (George Washington) <i>Associate Professor of Neurology in Department of Medicine and Associate Professor of Biochemistry</i>	2918 Friendship Road
Henry J. Katz (1967), M.A.T. (Duke) <i>Temporary Instructor in Mathematics</i>	1118 Woodburn Road

*Through 8-31-69.

†Through 6-30-69.

Samuel Lawrence Katz (1968), M.D. (Harvard)
Professor of Pediatrics 2212 D Elba Street

William J. Katzenmeyer (1967), Ed.D. (Duke)
Associate Professor of Education 1636 Marion Avenue

Bernard Kaufman (1968), Ph.D. (Indiana)
Associate Professor of Biochemistry 2900 Arnold Road

Charles Rush Keith (1963), M.D. (Kansas Univ. Medical School)
Assistant Professor of Psychiatry Route 4, Box 47, Chapel Hill, N. C.

Thomas F. Keller (1959), Ph.D. (Michigan)
Professor of Business Administration 1024 West Markham Avenue

Ginger Kelly (1969), M.A. (Texas)
Instructor of Physical Education 4216 Garrett Road, Apartment B2

William Nimmons Kelley (1968), M.D. (Emory)
Assistant Professor of Medicine and Assistant Professor of Biochemistry 2740 Montgomery

Walter Kempner (1934), M.D. (Heidelberg)
Professor of Medicine 1505 Virginia Avenue

Patrick Dan Kenan (1965), M.D. (Duke)
Assistant Professor of Otolaryngology 804 Anderson Street

Van Leslie Kenyon, Jr. (1945), M.M.E. (Virginia)
Professor of Mechanical Engineering Route 2
Hillsborough, N. C.

Grace Pardridge Kerby (1947), M.D. (Duke)
Professor of Medicine 1108 Wells Street

Alan C. Kerckhoff (1958), Ph.D. (Wisconsin)
Professor of Sociology 1511 Pinecrest Road

Robert B. Kerr (1965), Ph.D. (Johns Hopkins)
Professor of Electrical Engineering 2220 Elmwood Avenue

Roby Morton Kerr (1969), (Tulane)
Associate in Psychiatric Social Work 1909 Burlington Street

Kaye H. Kilburn (1962), M.D. (Utah)
Associate Professor of Medicine and Assistant Professor of Anatomy 3935 Hamstead Court

Burton B. King (1967), M.A. (Northwestern)
Associate in Surgery 3404 Duke Homestead Road

*James LeRoy King (1967), M.D. (Bowman Gray)
Assistant Professor of Anesthesiology 1620 University Drive

Terry D. King (1969), M.D. (Texas)
Associate in Pediatrics 633 Starmont Drive

Thomas DeArman Kinney (1960), M.D. (Duke)
R. J. Reynolds Tobacco Company Professor of Medical Education and Professor of Pathology 3120 Devon Road

Marcel Kinsbourne (1967), M.D. (Oxford)
Associate Professor of Pediatrics and Neurology and Lecturer in Psychology 2528 Wrightwood Avenue

Warren Kirkendale (1967), Dr.phil. (Vienna)
Associate Professor of Musicology 2422 Tryon Road

Norman Kirshner (1956), Ph.D. (Pennsylvania State)
Associate Professor of Biochemistry 2524 Wrightwood Avenue

Paul M. Kirwin (1969), Ph.D. (Texas)
Associate in Medical Psychology in the Department of Psychiatry 1600 Anderson Street
Apartment 7D

Joseph Weston Kitchen, Jr. (1962), Ph.D. (Harvard)
Associate Professor of Mathematics 1600 Delaware Avenue

*Through 2-28-69.

- Mathias S. M. Kiwanuka (1969), Ph.D. (London)
Visiting Lecturer of History 814 Onslow
- Gunter Klages (1965), B.A. (Freiburg, Germany)
Temporary Instructor in German 801 Underwood Avenue
- †Robert Frederick Klein (1963), M.D. (Alabama)
Assistant Professor of Medicine 2740 Spencer Street
- William J. Klein, Jr. (1969), M.D. (Columbia)
Associate in Medicine 1607 Sycamore Street
- Gordon K. Klintworth (1964), Ph.D. (Witwatersrand, South Africa)
Associate Professor of Pathology 614 Starmont Drive
- Peter H. Klopfer (1958), Ph.D. (Yale)
Professor of Zoology Route 1, Box 293
- Conrad Merton Knight (1961), B.S. (Norwich)
Associate in Community Health Sciences
and Associate in Radiology 4603 Blanchard Road
- †Douglas Maitland Knight (1963), Ph.D. (Yale), Litt.D., LL.D., L.H.D.
Professor of English 1508 Pinecrest Road
- §F. X. Calvin Knobloch (1967), Ph.D. (Florida)
Associate in Speech Pathology and Audiology in
Department of Surgery 121 Larkspur Circle
- Kenneth R. Knoerr (1961), Ph.D. (Yale)
Associate Professor of Forest Meteorology in School of
Forestry and Associate Professor of Biometeorology in
Department of Botany 1608 Woodburn Road
- Delmar H. Knudson (1969), M.D. (Temple)
Associate in Radiology Colonial Apartments-56C
- Erika-Anette Koepfel (1969), M.A. (Seminar Cologne, Germany)
Temporary Instructor of German 143 Hamilton Road, Chapel Hill, N. C.
- Yi-Hong Kong (1967), M.D. (National Defense Medical Center, Taipei, Taiwan)
Assistant Professor of Medicine 3822 Hillgrand Drive
- Allan Kornberg (1965), Ph.D. (Michigan)
Professor of Political Science 23 Scott Place
- Wesley Kort (1965), Ph.D. (Chicago)
Assistant Professor of Religion 3514 Winding Way
- Helen T. Kotin (1967), M.D. (Colorado)
Associate in Community Health Sciences 46 Chicopee Trail
- Paul Jackson Kramer (1931), Ph.D. (Ohio State)
James B. Duke Professor of Botany 2251 Cranford Drive
- Richard B. Kramer (1968), Ph.D. (Chicago)
Assistant Professor of Psychology Route 4, Roxboro, N. C.
- *Frederick H. Krantz (1965), A.B. (Columbia)
Instructor in History 808 Berkeley Street
- Edward Kready Kraybill (1939), Ph.D. (Michigan)
Associate Professor of Electrical Engineering 2726 Circle Drive
- Sandra Jo Krebs (1967), M.A. (Middlebury)
Temporary Instructor in German 1102 Monmouth Avenue
- Nicholas M. Kredich (1968), M.D. (Michigan)
Assistant Professor of Medicine and Assistant Professor of
Biochemistry 57 Kimberly Drive

*Through 8-31-69.

†Through 6-30-69.

‡Through 6-30-69.

§Through 5-31-69.

- Irwin Kremen (1963), Ph.D. (Harvard)
*Assistant Professor of Psychology and Assistant Professor of
 Medical Psychology in the Department of Psychiatry* 216 Forestwood Drive
- William B. Kremer (1966), M.D. (Upstate Medical School)
Assistant Professor of Medicine Route 2, Hillsborough, N. C.
- Juanita M. Kreps (1955), Ph.D. (Duke)
Professor of Economics Morgan Creek Road
 Chapel Hill, N. C.
- William R. Krigbaum (1952), Ph.D. (Illinois), D.Sc.
James B. Duke Professor of Chemistry 2504 Wilson Street
- Ronald P. Krueger (1969), M.D.
Associate in Pediatrics 3504 Preston
- Robert C. Krueger (1961), D.Phil. (Oxon.)
Associate Professor of English Route 2, Box 484
- Arnold D. Krugman (1964), Ph.D. (Kentucky)
*Associate Professor of Medical Psychology in the Department
 of Psychiatry and Lecturer in Psychology* 2605 Tanglewood Drive
- Magnus Jan Krynski (1966), Ph.D. (Columbia)
Associate Professor of Slavic Literatures 1004 West Markham
- W. W. Kulski (1963), LL.D. (Paris)
*James B. Duke Professor of Russian Affairs
 in Department of Political Science* 1624 Marion Avenue
- Sudhir Kumar (1963), Ph.D. (Pennsylvania)
Visiting Associate Professor of Civil Engineering 2307 Sprunt Street
- G. Charles Kyker, Jr. (1967), Ph.D. (Duke)
Instructor in Physics Apartment J-4
 807 Demerius Street
- Johannes A. Kylstra (1965), M.D., Ph.D. (Leiden)
*Associate Professor of Medicine and
 Assistant Professor of Physiology* 2924 Friendship Road
- Maurine Boie LaBarre (1961), M.S.W. (Bryn Mawr)
Assistant Professor of Psychiatric Social Work Mt. Sinai Road, Route 1
- Weston La Barre (1946), Ph.D. (Yale)
Professor of Anthropology Mt. Sinai Road, Route 1
- Peregrina N. LaBay (1968), M.D. (St. Thomas, Manila)
*Assistant Professor of Urology in Department
 of Surgery* 2522 Sevier Street
- Leon Lack (1965), Ph.D. (Columbia)
Associate Professor of Pharmacology 1521 Hermitage Court
- Creighton Lacy (1953), B.D., Ph.D. (Yale)
Professor of World Christianity 2714 Dogwood Road
- Martin Lakin (1958), Ph.D. (Chicago)
*Professor of Medical Psychology in Department of Psychiatry
 and Professor of Psychology* 2709 McDowell Street
- N. Lakshminarayanaiah (1969), Ph.D. (London)
Visiting Professor of Pharmacology H-6 Westover Apartments
 Pratt Street
- Maurice B. Landers, III (1969), M.D. (Michigan)
Assistant Professor of Ophthalmology 2965 Friendship Road
- David J. Lang (1968), M.D. (Harvard)
Associate Professor of Pediatrics 1817 Woodburn Road
- Karla Langedijk (1969), Ph.D. (Amsterdam)
Lecturer in Art 1110 Wells Street
- Thomas A. Langford (1956), B.D., Ph.D. (Duke)
Professor of Religion 2002 Dartmouth Drive
- John Tate Lanning (1927), Ph.D. (California)
James B. Duke Professor of History 3007 Surrey Road
- †Sabbatical leave fall semester 1969-70.

Arthur Larson (1958), D.C.L. (Oxon.) <i>Professor of Law</i>	3408 Dover Road Route 1, Box 266 Cornwallis Road
John Laszlo (1960), M.D. (Harvard) <i>Associate Professor of Medicine</i>	
Elvin Remus Latty (1937), J.Sc.D. (Columbia) <i>William R. Perkins Professor of Law</i>	3620 Hathaway Road
Peter K. Lauf (1968), M.D. (Freiburg) <i>Assistant Professor of Physiology</i>	3535 Hamstead Court 303 Ridgecrest Chapel Hill, N. C.
*Danny J. Laughhunn (1968), D.B.A. (Illinois) <i>Assistant Professor of Business Administration</i>	
Patricia Lawrence (1964), M.A. (Columbia) <i>Assistant Professor of Nursing</i>	4711 Easley Street
Margaret D. Lawson (1969), M.N. (Florida) <i>Instructor, School of Nursing (Pediatrics)</i>	2508 Englewood Avenue
Richard H. Leach (1955), Ph.D. (Princeton) <i>Professor of Political Science</i>	1313 Woodburn Road
John LeBar (1965), M.S. (Kansas State Teachers Coll.) <i>Instructor in Physical Education</i>	923 Demerius Street
Harold E. Lebovitz (1962), M.D. (Pittsburgh) <i>Associate Professor of Medicine and Assistant Professor of Physiology</i>	1847 Woodburn Road Route 8, Box 347 Goodwin Road
John C. LeMay (1961), D.V.M. (Georgia) <i>Associate Professor of Veterinary Medicine</i>	
Warren Lerner (1961), Ph.D. (Columbia) <i>Associate Professor of History</i>	2104 Dartmouth Drive
Lawrence Lessin (1968), M.D. (Chicago) <i>Associate in Medicine</i>	3415 Cromwell Road
Richard G. Lester (1965), M.D. (Columbia) <i>Professor of Radiology</i>	2703 Montgomery Avenue
Donald S. Leventhal (1965), Ph.D. (Purdue) <i>Assistant Professor of Medical Psychology in the Department of Psychiatry and Associate in Pediatrics</i>	4002 Hillgrand Circle
*Judith Charlotte Levinson (1968), Ph.D. (Harvard) <i>Assistant Professor of English</i>	62-A Colonial Apartments
David Edmund Lewis (1968), M.A. (Northern Michigan) <i>Associate in Community Health Sciences</i>	R-8 Smallwood Road
Harold Walter Lewis (1946), Ph.D. (Duke) <i>Professor of Physics</i>	1708 Woodburn Road
Martha Modena Lewis (1933), M.A. (Columbia) <i>Professor of Physical Education</i>	407 Erwin Apartments
†Ralph Elton Lewis (1941), M.S. in M.E. (Illinois) <i>Assistant Professor of Mechanical Engineering</i>	1401 Alabama Avenue
Melvin Lieberman (1968), Ph.D. (Downstate Medical Center) <i>Assistant Professor of Physiology and Pharmacology</i>	426 Green Street
John L. Lievsay (1962), Ph.D. (Washington) <i>Professor of English</i>	2725 Montgomery Street
Darwyn E. Linder (1965), Ph.D. (Minnesota) <i>Associate Professor of Psychology</i>	4029 Nottaway Road
L. Sigfred Linderth (1965), M.S. (Iowa State) <i>Professor of Mechanical Engineering</i>	2220 Whitley Drive
Nelson R. Lipshutz (1967), Ph.D. (Chicago) <i>Assistant Professor of Physics</i>	2703 Sarah Avenue

*Through 8-31-69.

†Leave of absence spring semester 1969-70.

- Hans Lischka (1969), M.A. (Duke)
Instructor of History 3808 Swarthmore Road
- Charles Harris Livengood, Jr. (1946), LL.B. (Harvard)
Professor of Law 2804 Chelsea Circle
- Daniel A. Livingstone (1956), Ph.D. (Yale)
Professor of Zoology 626 Starmont Drive
- Charles E. Llewellyn, Jr. (1955), M.D. (Medical College of Virginia)
Associate Professor of Psychiatry 3550 Hamstead Court
- Jane Marie Lloyd (1961), M.A. (North Carolina)
Assistant Professor of Physical Education 704 Louise Circle
- Charles H. Lochmuller (1969), Ph.D. (Fordham)
Assistant Professor of Chemistry 3016 Mossdale
- Gregory Lockhead (1965), Ph.D. (Johns Hopkins)
Associate Professor of Psychology 101 Emerald Circle
- Ernest Croft Long (1956), M.B., B.S., Ph.D. (London)
Professor of Community Health Sciences;
Associate Professor of Physiology and Route 7, Box 218
Pharmacology; and Associate in Pediatrics Erwin Road
- William K. Longley (1968), Ph.D. (Birkbeck College, London)
Assistant Professor of Anatomy 47 Lebanon Circle
- *Raul I. Lopez (1968), M.D. (Florida)
Associate in Neurology in Department of Medicine 1017 Anderson Street
- †James R. Lord (1967), Th.M. (Duke)
Instructor in Religion 1000 N. Duke Street, Apt. 19
- James D. Louck (1969), Ph.D. (Ohio State)
Visiting Professor of Physics 1200 Leon, Apartment B1
- David Love (1969), B.A. (Bristol, England)
Temporary Instructor of Philosophy 1103 Pittsboro Road
- Hans Lowenbach (1940), M.D. (Hamburg)
Professor of Psychiatry and Assistant Professor of Pediatrics Chapel Hill, N. C.
 Route 3, Box 273
- ‡Patricia Barlow Lowery (1968), M.S.N. (Duke)
Instructor in Nursing Old Apex Road
- William W. Lowrance (1969), M.H.A. (Duke)
Adjunct Assistant Professor 1314 Doylin Drive
 Chapel Hill, N. C.
 1829 Front Street
 Apartment A-4
- Ronald B. Luftig (1969), Ph.D. (Chicago)
Assistant Professor of Microbiology
- Lorenzo A. Lynch (1969), Ph.D. (Duke)
Visiting Lecturer in Church and Society 1219 Fayetteville Street
- William S. Lynn, Jr. (1954), M.D. (Columbia)
Professor of Medicine and Associate Professor of Biochemistry 4014 Bristol Road
- George W. Lynts (1965), Ph.D. (Wisconsin)
Assistant Professor of Geology 3328 Rolling Hill Road
- George M. Lyon, Jr. (1967), M.D. (Duke)
Assistant Professor of Pediatrics 1510 Southwood Drive
- Angus M. McBryde (1931), M.D. (Pennsylvania)
Professor of Pediatrics 3406 Westover Road
- Kenneth Scott McCarty (1959), Ph.D. (Columbia)
Professor of Biochemistry 2713 Dogwood Road
- Thomas E. McCollough (1961), Th.D. (Southern Baptist Theological Seminary)
Associate Professor of Religion 2227 Cranford Road
- Donald E. McCollum (1962), M.D. (Bowman Gray)
Associate Professor of Orthopaedic Surgery 2207 Wilshire Drive
- *Through 6-30-69.
 †Through 8-31-69.
 ‡Through 1-29-69.

§William Charles McCormack (1964), Ph.D. (Chicago) <i>Associate Professor of Sociology</i>	1326 Welcome Circle
Everett N. McCormick (1969), M.D. (Florida) <i>Associate in Radiology</i>	16 Ashley Road
Alice L. McCrea (1961), M.S. (Chicago) <i>Assistant Professor of Radiation Therapy</i>	Route 2, Umstead Road
||Gelolo McHugh (1946), Ph.D. (Columbia) <i>Associate Professor of Psychology</i>	1010 Monmouth Avenue
Henry Deane McIntosh (1955), M.D. (Pennsylvania) <i>Professor of Medicine</i>	2705 Stuart Drive
John C. McKinney (1957), Ph.D. (Michigan) <i>Professor of Sociology and Professor of Medical Sociology in Department of Psychiatry</i>	1627 Marion Avenue
Mary Helen McLachlan (1958), M.A. (Missouri) <i>Associate Professor of Dietetics and Acting Director</i>	2022 Bivins Street
*Byron D. McLees (1967), M.D. (Duke) <i>Associate in Medicine</i>	49-C Colonial Apartments
Michael E. McLeod (1966), M.D. (Duke) <i>Assistant Professor of Medicine</i>	4007 Deepwood Circle
Samuel M. McMahon (1968), M.D. (Ohio State) <i>Associate in Medicine</i>	5343 Yardley Terrace
Thomas Joseph McManus (1961), M.D. (Boston) <i>Associate Professor of Physiology and Pharmacology</i>	1408 Oakland Avenue
Andrew McPhail (1968), Ph.D. (Glasgow) <i>Associate Professor of Chemistry</i>	220 Forestwood Drive
Harry Thurman McPherson (1955), M.D. (Duke) <i>Associate Professor of Medicine</i>	3915 Nottaway Road
John Nelson Macduff (1956), M.M.E. (New York) <i>Professor of Mechanical Engineering</i>	2733 Dogwood Road
George L. Maddox (1960), Ph.D. (Michigan State) <i>Professor of Sociology and Professor of Medical Sociology in Department of Psychiatry</i>	2750 McDowell Street
Moses Stephen Mahaley (1965), Ph.D. (Duke) <i>Assistant Professor of Neurosurgery and Assistant Professor of Anatomy</i>	3940 Nottaway Road
Edward P. Mahoney (1965), Ph.D. (Columbia) <i>Assistant Professor of Philosophy</i>	1000 North Duke Street Apartment 49
Joseph M. Malin, Jr. (1968), M.D. (Georgetown Univ.) <i>Assistant Professor of Urology in Department of Surgery</i>	416 Carolina Circle
James D. Mallory, Jr. (1969), M.D. (Duke) <i>Associate in Psychiatry</i>	22 Willow Drive Asheville, N. C.
Bruno Maraviglia (1969), Ph.D. (Florence Univ., Italy) <i>Visiting Assistant Professor of Physics</i>	2412 Vesson Avenue
Peter N. Marinos (1968), Ph.D. (North Carolina State) <i>Associate Professor of Electrical Engineering</i>	9-C Anderson Street Apartments
Joseph Eldridge Markee (1943), Ph.D. (Chicago) <i>James B. Duke Professor of Anatomy</i>	1015 Demerius Street
Sidney David Markman (1947), Ph.D. (Columbia) <i>Professor of Art History and Archaeology</i>	919 Urban Avenue
Gail R. Marsh (1969), Ph.D. (Iowa) <i>Associate in Medical Psychology</i>	1200 Leon Street Apartment B-2

§Through 8-31-69.

||Sabbatical leave 1969-70.

*Through 6-30-69.

†Arthur Morrison Martin (1968), M.D. (Duke) <i>Assistant Professor of Pathology</i>	2411 Pickett Road
David V. Martin (1962), Ed.D. (Duke) <i>Associate Professor of Education</i>	1527 Hermitage Court
Joan C. Martin (1969), Ph.D. (Florida State) <i>Assistant Professor of Medical Psychology</i>	611 W. Markham Avenue
William Francis Martin (1968), B.S. (Cornell) <i>Assistant Professor of Naval Science</i>	116 Monterey Lane
Donald J. Massaro (1967), M.D. (Georgetown) <i>Associate Professor of Medicine</i>	2957 Welcome Drive
Raymond Massengill, Jr. (1964), Ph.D. (Virginia) <i>Assistant Professor in Medical Speech Pathology in the Department of Surgery</i>	2734 Spencer Street
F. Maxton Mauney (1967), M.D. (Duke) <i>Assistant Professor of Surgery and Assistant Professor of Community Health Sciences</i>	118 Newell Street
Seymour Mauskopf (1964), Ph.D. (Princeton) <i>Assistant Professor of History</i>	1900 Glendale Avenue
*William Cary Maxwell (1930), Ph.D. (Heidelberg) <i>Associate Professor of German</i>	142 Pinecrest Road
Demmie G. Mayfield (1964), M.D. (Texas) <i>Associate Professor of Psychiatry</i>	West Trinity Avenue Apartment 3-301
Elias Meezan (1969), Ph.D. (Duke) <i>Assistant Professor of Pharmacology</i>	513 Hollyridge Drive
Otto Meier, Jr. (1934), Ph.D. (Pennsylvania) <i>Professor of Electrical Engineering</i>	113 Pinecrest Road
Elgin W. Mellown (1965), Ph.D. (London) <i>Associate Professor of English</i>	1108 Minerva Avenue
Lorne Mendell (1968), Ph.D. (Massachusetts Instit. of Tech.) <i>Assistant Professor of Physiology and Pharmacology</i>	16-F Sharon Heights Chapel Hill, N. C.
Elijah Eugene Menefee, Jr. (1940), M.D. (Duke) <i>Professor of Medicine</i>	2205 Cranford Road
†James L. Meriam (1963), Ph.D. (Yale) <i>Professor of Engineering Mechanics</i>	3434 Rugby Road
Ronald L. Messanari (1969), Ph.D. (Duke) <i>Visiting Assistant Professor of Church History</i>	844 Louise Circle
Louis J. Metz (1963), Ph.D. (Duke) <i>Adjunct Associate Professor of Forest Soils</i>	928 Kathryn Street Cary, N. C.
Richard S. Metzgar (1962), Ph.D. (Buffalo) <i>Associate Professor of Immunology</i>	3613 Westover Road
Horst Meyer (1959), Docteur ès Sciences (Geneva) <i>Professor of Physics</i>	1411 Anderson Street
Eric M. Meyers (1969), Ph.D. (Harvard) <i>Assistant Professor of Religion</i>	1911 C House Avenue
Paul J. Meyvaert (1967) <i>Lecturer in Art</i>	512 Watts Street
M. Victor Michalak (1950), Ph.D. (Indiana) <i>Associate Professor of English</i>	804 Louise Circle
Donald S. Miller (1969), M.D. (Harvard) <i>Associate in Medicine</i>	713 Anderson Street
Gustavus H. Miller (1955), Ph.D. (Michigan) <i>Assistant Professor of Romance Languages</i>	Bartram Drive Chapel Hill, N. C.

*Leave of absence 1969-70.

†Through 10-1-69.

‡Sabbatical leave 1969-70.

- Elliott Mills (1968), Ph.D. (Columbia)
Assistant Professor of Physiology and Pharmacology 3102 Oxford Drive
- Wilma A. Minniear (1964), M.S.N. (Western Reserve)
Associate Professor of Nursing 5203 Shady Bluff Road
- Neil Mitchell (1967), M.D. (Ireland)
Associate in Psychiatry 24 Wisteria Drive
 Asheville, N. C.
- *Richard A. Mladick (1968), M.D. (Northwestern)
Assistant Professor of Plastic Surgery 1911 House Street
- †Robert C. Moeller, III (1968), M.A. (Harvard)
Assistant Professor of Art 3742 Bentley Drive
- Gerald C. Monsman (1965), Ph.D. (Johns Hopkins)
Assistant Professor of English 1421 N. Mangum Street
- John W. Moore (1961), Ph.D. (Virginia)
Professor of Physiology 605 Kenmore Road
- Lawrence C. Moore, Jr. (1966), Ph.D. (California Institute of Technology)
Assistant Professor of Mathematics 2402-A Lednum Street
- James J. Morris (1963), M.D. (State Univ. of New York)
Associate Professor of Medicine 2903 Buckingham Road
- ‡Montrose J. Moses (1959), Ph.D. (Columbia)
Associate Professor of Anatomy 152 Pinecrest Road
- Earl George Mueller (1945), Ph.D. (Iowa)
Professor of Art 1001 Gloria Avenue
- Julia Wilkinson Mueller (1939-41; 1946), M.A. (Iowa)
Professor of Music 1001 Gloria Avenue
- Bruce Muga (1967), Ph.D. (Illinois)
Associate Professor of Civil Engineering 4110 King Charles Road
- Arvin W. Murch (1969), Ph.D. (Yale)
Assistant Professor of Sociology 216 Forestwood Drive
- §Francis J. Murray (1960), Ph.D. (Columbia)
Professor of Mathematics 1011 Homer Street
- James C. Murray (1967), Ph.D. (Cornell)
Assistant Professor in Romance Languages 9-B Anderson Street Apartments
- James J. Murray (1967), M.S. (Chicago)
Adjunct Associate Professor of Mechanical Engineering 809 Hudson Street
- A. Wendell Musser (1963), M.D. (Indiana)
Associate Professor of Pathology 2810 Dogwood Road
- Marc J. Musser (1966), M.D. (Wisconsin)
Professor of Medicine 2756 McDowell Street
- George C. Myers (1968), Ph.D. (Washington)
Professor of Sociology
- Hiroshi Nagaya (1966), M.D. (Tokyo)
Assistant Professor of Medicine 2910 Friendship Road
- Toshio Narahashi (1962-63; 1965), Ph.D. (Tokyo)
Professor of Physiology 812 Archdale Road
- Thomas H. Nash, Jr. (1959), B.S.M.E. (Iowa State)
Assistant Professor of Mechanical Engineering 2527 Wrightwood Avenue
- Blaine S. Nashold, Jr. (1957), M.D. (McGill)
Associate Professor of Surgery in Division of Neurosurgery 410 East Forest Hills Boulevard
- Sydney H. Nathans (1969), M.A. (Johns Hopkins)
Assistant Professor in History 804 Tinkerbell Road
 Chapel Hill, N. C.

*Through 12-31-68.

†Through 12-31-69.

‡Sabbatical leave fall semester 1969-70.

§Leave of absence 1969-70.

- Dorothy E. Naumann (1963), M.D. (Syracuse)
Associate in Community Health Sciences 2004 Tampa Avenue
- Aubrey Willard Naylor (1952), Ph.D. (Chicago)
Professor of Botany 2430 Wrightwood Avenue
- *Thomas Herbert Naylor (1964), Ph.D. (Tulane)
Professor of Economics 2727 Spencer Street
- Francis A. Neelon (1969), M.D. (Harvard)
Associate in Medicine 2216 West Club Boulevard
- Glenn Robert Negley (1946), Ph.D. (Chicago)
Professor of Philosophy 2330 Hilton Avenue
 Apartment 8
- M. Wilson Nesbitt, Jr. (1957), B.D. (Duke), D.D.
Adjunct Professor of the Work of the Rural Church 1609 Peace Street
- Charles W. Neville, Jr. (1964), M.D. (Vanderbilt)
Assistant Professor of Psychiatry 56 Woodbury Road, Asheville, N. C.
- Barbara Carol Newborg (1952), M.D. (Johns Hopkins)
Associate in Medicine 1503 Virginia Avenue
- Henry Winston Newson (1948), Ph.D. (Chicago)
James B. Duke Professor of Physics 1111 North Gregson Street
- Francis Newton (1967), Ph.D. (North Carolina)
*Professor of Latin and Chairman of the
 Department of Classical Studies* 2809 Legion Avenue
- William McNeal Nicholson (1935), M.D. (Johns Hopkins)
Professor of Medicine 824 Anderson Street
- R. Bruce Nicklas (1965), Ph.D. (Columbia)
Associate Professor of Zoology 3101 Camelot Court
- Harry Stewart Nielsen (1967), Ph.D. (Ohio State)
Assistant Professor of Microbiology 1314 Gregson Street
- Nancy Nolan (1964), M.Sc. (Ohio State)
Assistant Professor of Nursing 2728 Brown Avenue
- †Loren W. Nolte (1966), Ph.D. (Michigan)
Associate Professor of Electrical Engineering 2708 Sevier Street
- Robert J. Nordstrom (1968), J.D. (Michigan)
Professor of Law 2512 N. Duke Street
- Sue Norville (1966), M.S.N. (Emory)
Assistant Professor of Nursing 705 Louise Circle
- Richey A. Novak (1969), Ph.D. (Johns Hopkins)
Assistant Professor of German 3443 Rugby Road
- John B. Nowlin (1967), M.D. (Duke)
Assistant Professor in Community Health Sciences 1310 E. Leon Street
- Yasuhiko Nozaki (1966), Ph.D. (Tokyo)
Associate in Biochemistry 2527 Vesson Avenue
- Holger Olof Nygard (1960), Ph.D. (California)
Professor of English Route 2, Cole Mill Road
- John F. Oates (1967), Ph.D. (Yale)
*Associate Professor of Ancient History in the Department of
 Classical Studies* 708 N. Buchanan Boulevard
- Walter D. Obrist (1957), Ph.D. (Northwestern)
*Professor of Medical Psychology in Department of
 Psychiatry and Lecturer in Psychology* 2604 McDowell Street
- Guy Leary Odom (1943), M.D. (Tulane)
Professor of Neurosurgery 2812 Chelsea Circle
- William M. O'Barr (1969), M.A. (Northwestern)
Assistant Professor of Anthropology 804 Berkeley St.

*Leave of absence 1969-70.

†Leave of absence 1969-70.

William M. O'Fallon (1965), Ph.D. (Vanderbilt)	Glen Heights
Assistant Professor of Community Health Sciences	Chapel Hill, N. C.
Samuel R. Oleinick (1969), Ph.D. (Pennsylvania)	
Assistant Professor of Immunology	1902 Cole Mill Road
Billy B. Olive (1960), LL.B. (St. Johns)	Box 280-2, Route 1
Adjunct Associate Professor of Electrical Engineering	Mt. Sinai Road
F. Hodge O'Neal (1959), S.J.D. (Harvard)	Route 1, Box 172
Professor of Law	Mt. Sinai Road
Bernard V. O'Neill, Jr. (1968), Ph.D. (Brown)	
Assistant Professor of Mathematics	702 N. Buchanan Boulevard
Edward Stewart Orgain (1934), M.D. (Virginia)	
Professor of Medicine	3321 Devon Road
Robert Tappan Osborn (1954), B.D., Ph.D. (Drew)	
Associate Professor of Religion	2732 McDowell Street
Shirley K. Osterhout (1967), M.D. (Duke)	
Associate in Pediatrics	600 Starmont Drive
Snydam Osterhout (1959), Ph.D. (Rockefeller Institute)	
Associate Professor of Microbiology and Associate Professor of	
Medicine and Associate Director for Admissions	600 Starmont Drive
Athos Ottolenghi (1959), M.D. (Tavia)	
Associate Professor of Pharmacology	918 Green Street
Harry Ashton Owen, Jr. (1951), Ph.D. (North Carolina State)	
Professor of Electrical Engineering	2741 McDowell Street
George Padilla (1965), Ph.D. (California)	
Associate Professor of Physiology	2027 Bivins Street
David Paletz (1967), M.A. (California)	
Instructor in Political Science	1311 Carolina Avenue
Aubrey Edwin Palmer (1944), B.S., C.E. (Virginia)	
Associate Professor of Civil Engineering	2525 Highland Avenue
Richard A. Palmer (1966), Ph.D. (Illinois)	
Assistant Professor of Chemistry	126 Pinecrest Road
Erdman B. Palmore (1967), Ph.D. (Columbia)	
Associate Professor of Medical Sociology in Department of Psychiatry and	
Associate Professor of Sociology	1400 Welcome Circle
Harold Talbot Parker (1939), Ph.D. (Chicago)	
Professor of History	923 Dacian Avenue
Joseph C. Parker, Jr. (1969), M.D. (Minnesota)	1200 Leon Street
Assistant Professor of Pathology	Apartment H-2
Roy T. Parker (1954), M.D. (Virginia)	
Professor of Obstetrics and Gynecology	111 Pinecrest Road
Harry B. Partin (1964), Ph.D. (Chicago)	
Assistant Professor of Religion	2739 Spencer Street
Joel Francis Paschal (1954), Ph.D. (Princeton)	
Professor of Law	1527 Pinecrest Road
Merrill Lee Patrick (1964), Ph.D. (Carnegie Institute of Technology)	
Associate Professor of Mathematics	25 Scott Place
Ransom Rathbone Patrick (1954), Ph.D. (Princeton)	
Professor of Art History	116 Pinecrest Road
F. M. S. Patterson (1968), M.D. (Pennsylvania)	410 Clayton Road
Assistant Professor of Surgery	Chapel Hill, N. C.
Lewis Patton (1926), Ph.D. (Yale)	
Professor of English	614 Swift Avenue
Zdenek Daniel Pauk (1967), M.D. (Iowa)	
Assistant Professor of Psychiatry	3818 Lyckan Parkway
Hilda I. Pavlov (1960), M.A. (Leningrad)	
Assistant Professor of Slavic Languages	709 Reta Road

- Michael I. Pavlov (1960), M.A. (Leningrad)
Assistant Professor of Slavic Languages 709 Reta Road
- William Bernard Peach (1951), Ph.D. (Harvard)
Professor of Philosophy 920 Dacian Avenue
- Daniel T. Peak (1969), M.D. (Wisconsin)
Associate in Psychiatry 3307 Pinafore Drive
- George W. Pearsall (1964), Sc.D. (Massachusetts Institute of Technology)
Professor of Mechanical Engineering 2941 Welcome Drive
- *Birger A. Pearson (1966), B.D. (Pacific Lutheran Seminary), Ph.D. (Harvard)
Assistant Professor of Religion 3212 Pinafore Drive
- Talmage Lee Peele (1939), M.D. (Duke)
Professor of Anatomy; Associate Professor of Neurology;
Assistant Professor of Pediatrics; and
Lecturer in Psychology KD2 University Apartments
- Charles Henry Peete, Jr. (1953), M.D. (Harvard)
Professor of Obstetrics and Gynecology 42 Beverly Drive
- William P. J. Peete (1955), M.D. (Harvard)
Professor of Surgery 2814 Chelsea Circle
- †Jacques H. Perivier (1965), Ph.D. (Pennsylvania)
Assistant Professor of Romance Languages Four Seasons Apartments
- Ronald Perkins (1969), Ph.D. (Indiana)
Associate Professor of Geology 1911 House Avenue
- Harold Sanford Perry (1932), Ph.D. (Cornell)
Professor of Botany 2719 Montgomery
- Edythe Mae Persing (1964), M.N. (Western Reserve)
Assistant Professor of Nursing 2302 Cranford Road
- Elbert Lapsley Persons (1930), M.D. (Harvard)
Professor of Medicine and Associate Professor of
Community Health Sciences Route 2, Chapel Hill, N. C.
- Walter Scott Persons (1930), A.B. (Duke)
Associate Professor of Physical Education 723 Anderson Street
- Ernst Peschel (1953), M.D. (Berlin)
Associate Professor of Medicine 612 Swift Avenue
- Robert H. Peter (1967), M.D. (Duke)
Assistant Professor of Medicine 2306 Pershing Street
- Anton Peterlin (1961), Ph.D. (Berlin)
Adjunct Professor of Chemistry 2710 McDowell Street
- Ray C. Petry (1937), Ph.D. (Chicago)
James B. Duke Professor of Church History 1212 Arnette Avenue
- Olan Lee Petty (1962), Ph.D. (Iowa)
Professor of Education 128 Pinecrest Road
- Eric A. Pfeiffer (1966), M.D. (Washington)
Assistant Professor of Psychiatry 2605 McDowell Street
- John Bernard Pfeiffer, Jr. (1949), M.D. (Cornell)
Professor of Medicine 3203 Cromwell Road
- Ralph W. Pfouts (1967; 1969), Ph.D. (North Carolina)
Visiting Professor of Economics 3414 Rugby Road
- Leland R. Phelps (1961), Ph.D. (Ohio State)
Professor of German 502 Ransom Street
- James Henry Phillips (1946), Ph.D. (Yale)
Professor of Religion Chapel Hill, N. C.
- Jane Philpott (1951), Ph.D. (Iowa State)
Professor of Botany 2255 Cranford Road
- 2517 Perkins Road
- 2260 Cranford Road

*Through 8-31-69.

†Through 8-31-69.

- Kenneth LeRoy Pickrell (1944), M.D. (Johns Hopkins)
Professor of Plastic Surgery 3 Sylvan Road
- Orrin H. Pilkey (1965), Ph.D. (Florida State)
Associate Professor of Geology Route 3, Highway 70
Hillsborough, N. C.
- Theo Clyde Pilkington (1961), Ph.D. (Duke)
*Professor of Biomedical Engineering and Professor of Electrical
Engineering and Chairman of Biomedical Engineering
Department* 2718 Spencer Street
- Colin G. Pitt (1969), Ph.D. (London)
Adjunct Associate Professor of Chemistry 2310 Prince Street
- Robert A. Pittillo, Jr. (1968), Ed.D. (Duke)
Associate Professor of Education Apartment D-10
1829 Front Street
- Jacques C. Poirier (1955), Ph.D. (Chicago)
Professor of Chemistry 210 West Lavender Street
- Grace Hilford Polansky (1968), M.S. (Western Reserve)
*Associate in Psychiatric Social Work in
Department of Psychiatry* 504 Watts Street
- Louis R. Pondy (1967), Ph.D. (Carnegie Institute of Technology)
*Associate Professor of Business Administration and Associate Professor of
Community Health Sciences* 1013 Monmouth Avenue
- F. Stanley Porter (1964), M.D. (Johns Hopkins)
Associate Professor of Pediatrics 2609 Cornwallis Road
- Ned A. Porter (1969), Ph.D. (Harvard)
Assistant Professor of Chemistry 3022 Chapel Hill Road
- Richard M. Portwood (1959), M.D. (Southwestern)
*Assistant Professor of Medicine and Assistant Professor of
Community Health Sciences* 54 Beverly Drive
- Raymond W. Postlethwait (1955), M.D. (Duke)
Professor of Surgery 1513 Pinecrest Road
- William H. Poteat (1960), B.D., Ph.D. (Duke)
Professor of Religion 621 Greenwood Road
Chapel Hill, N. C.
- Lois Ann Pounds (1969), M.D. (Pittsburgh)
Associate in Pediatrics Valley Terrace Apartments
Apartment 17B
- Benjamin E. Powell (1946), Ph.D. (Chicago)
Professor in the Faculty of Arts and Sciences 3609 Hathaway Road
- Philip C. Pratt (1966), M.D. (Johns Hopkins)
Associate Professor of Pathology 2707 Sevier Street
- Vernon Pratt (1964), M.F.A. (San Francisco Art Institute)
Assistant Professor in Art 1903 Glendale Avenue
- Richard Lionel Predmore (1950), D.M.L. (Middlebury)
Professor of Romance Languages 2535 Sevier Street
- Jack J. Preiss (1959), Ph.D. (Michigan State)
Professor of Sociology 2722 McDowell Street
- Richard A. Preston (1965), Ph.D. (Yale)
William K. Boyd Professor of History 1124 Woodburn Road
- James Ligon Price, Jr. (1952), Ph.D. (Cantab.)
Professor of Religion 2723 Circle Drive
- Reynolds Price (1958), B.Litt. (Oxon.)
Associate Professor of English Box 4813, Duke Station
- Jesse Harris Proctor, Jr. (1958), Ph.D. (Harvard)
Professor of Political Science 613 Swift Avenue
- *Jack Hale Prost (1966), Ph.D. (Chicago)
*Assistant Professor of Anatomy and Assistant
Professor of Anthropology* 807 Onslow Street

*Through 8-31-69.

A. Kenneth Pye (1966), LL.M. (Georgetown) <i>Professor of Law</i>	2802 Chelsea Circle
Steven H. Quarfordt (1968), M.D. (New York) <i>Associate in Medicine</i>	3300 Pinafore Drive
Louis D. Quin (1957), Ph.D. (North Carolina) <i>Professor of Chemistry</i>	2740 McDowell Street
Galen W. Quinn (1958), D.D.S. (Tennessee) <i>Professor of Orthodontics</i>	806 East Forest Hills Boulevard
*Thomas T. Rainey (1967), Ph.D. (Illinois) <i>Assistant Professor of History</i>	1911 C House Avenue, Apt. 51
K. V. Rajagopalan (1966), Ph.D. (Madras) <i>Assistant Professor of Biochemistry</i>	2214 Elmwood Avenue
Charles W. Ralston (1954), Ph.D. (Duke) <i>Professor of Forest Soils</i>	2531 Wrightwood Avenue
John N. Ralsten (1969), M.D. (West Virginia) <i>Associate in Radiology</i>	1510 N. Duke Street
Cornelius H. Ram (1967), B.S. (Springfield College) <i>Assistant Professor of Naval Science</i>	3306 Rolling Hills Road
Jose Ramirez-Rivera (1968), M.D. (Yale) <i>Associate Professor of Medicine</i>	Valley Terrace Apartments
Dietolf Ramm (1969), Ph.D. (Duke) <i>Associate in Biomathematics and Computer Science Division</i>	833 Louise Circle
Barry W. Ramo (1969), M.D. (Colorado) <i>Associate in Medicine</i>	1100 Leon Street Apartment 20
Norman B. Ratliff (1968), M.D. (Duke) <i>Assistant Professor in Pathology</i>	2414 Sprunt Avenue
Calla Ann Raynor (1962), M.A.T. (North Carolina) <i>Assistant Professor of Physical Education</i>	858 Louise Circle
Frank Thompson Read (1968), LL.B. (Duke) <i>Assistant Professor of Law</i>	2340 Anthony Drive
Israel Thomas Reamer (1931), Ph.D. (Maryland) <i>Associate in Pharmacy</i>	2406 West Club Boulevard
Kenneth James Reardon (1947), M.A. (Boston) <i>Associate Professor of English</i>	2511 Winton Road
John B. Reckless (1963), M.D. (Birmingham) <i>Associate Professor of Psychiatry and Assistant Professor of Nursing</i>	2437 Tryon Road
*Wallace E. Reed (1965), Ph.D. (Chicago) <i>Assistant Professor of Economics</i>	2508 Sevier Street
Michael K. Reedy (1969), M.D. (Washington) <i>Associate Professor of Anatomy</i>	2525 Perkins
Edward Leo Reilly (1967), M.D. (Seton Hall, College of Medicine) <i>Assistant Professor in Psychiatry</i>	5216 Beaumont Drive
Edmund A. Reiss (1967), Ph.D. (Harvard) <i>Professor of English</i>	503 Compton Place
Burton W. Renager (1968), B.S. (Memphis State) <i>Assistant Professor of Naval Science</i>	3207 Shaftsbury Drive
Eugene M. Renkin (1963), Ph.D. (Harvard) <i>Professor of Physiology</i>	2028 Pershing Street
Jacqueline A. Reynolds (1969), Ph.D. (Washington, Seattle) <i>Associate in Biochemistry</i>	2009 Southwood Dr. Apartment 11

*Through 8-31-69.

- Thomas D. Reynolds (1953), Ph.D. (Duke)
Associate Professor of Mathematics 2502 Wrightwood Avenue
- John McFarlane Rhoads (1956), M.D. (Temple)
Professor of Psychiatry and Lecturer of Pastoral Care in Divinity School 2404 Prince Street
- Reed P. Rice (1965), M.D. (Indiana)
Associate Professor of Radiology 900 Cedar Falls Road
 Chapel Hill, N. C.
- Lawrence Richardson, Jr. (1966), Ph.D. (Yale)
Professor of Latin in Department of Classical Studies 1103 North Gregson Street
- *McMurry S. Richey (1954), B.D., Ph.D. (Duke)
Professor of Theology and Christian Nurture 2725 Dogwood Road
- Mac L. Ricketts (1965), Ph.D. (Chicago)
Assistant Professor of Religion 3318 Dixon Road
- John D. Riebel (1962), M.A. (Duke)
Assistant Professor of Physical Education 60 Oakwood Drive
 Chapel Hill, N. C.
- Dana Phelps Ripley (1959), Ph.D. (North Carolina)
Assistant Professor of Romance Languages 1303 Dollar Avenue
- Joann Ritchie (1967), M.N. (Texas Woman's Univ.)
Assistant Professor of Nursing Apartment B-11, 1829 Front Street
- Nathan Russell Roberson (1963), Ph.D. (Johns Hopkins)
Associate Professor of Physics 3406 Ogburn Court
- Jesse E. Roberts, Jr. (1968), M.D. (Louisiana State)
Associate in Medicine 2629 Cornwallis Road
- John Henderson Roberts (1931), Ph.D. (Texas)
Professor of Mathematics 2813 Legion Avenue
- J. David Robertson (1966), M.D. (Harvard), Ph.D. (Massachusetts Instit. of Tech.)
Professor of Anatomy 32 Oak Drive
- Charles K. Robinson (1961), B.D., Ph.D. (Duke)
Associate Professor of Philosophical Theology 126 Emerald Circle
- Hugh C. Robinson (1964), Ph.D. (Duke)
Associate Professor of Physics 2749 McDowell Street
- Roscoe R. Robinson (1962), M.D. (Oklahoma)
Professor of Medicine 3929 Nottaway Road
- Herman Robl (1959-64; 1966), Ph.D. (Vienna)
Adjunct Professor of Physics 2008 West Club Boulevard
- William James Kenneth Rockwell (1968), M.D. (Duke)
Assistant Professor of Psychiatry 3519 Donnigale Street
- Charles R. Roe (1969), M.D. (Duke)
Associate in Pediatrics 1409 Colewood Drive
- †Charles A. Rogers (1965), B.D. (Perkins School of Theology)
Assistant Professor of Historical Theology 2834 Stuart Drive
- Christiane Z. Romero (1967), Dr.Phil. (Vienna)
Visiting Assistant Professor of German 806 Onslow Street
- Theodore Ropp (1938), Ph.D. (Harvard)
Professor of History 302 East Woodridge Drive
- Carl M. Rose, Jr. (1967), Ph.D. (Chicago)
Assistant Professor of Physics 3109 Sherbon Drive
- David Rosenthal (1968), Ph.D. (Massachusetts Institute of Technology)
Adjunct Associate Professor of Chemistry
- Norman F. Ross (1937), D.D.S. (Temple)
Associate Professor of Dentistry 2811 Chelsea Circle

*Leave of absence 1969-70.

†Through 8-31-69.

- Wendell F. Rosse (1966), M.D. (Chicago)
Associate Professor of Medicine 3553 Hamstead Court
- Annette T. Rottenberg (1965), M.A. (Harvard)
Lecturer in English 1601 Hermitage Court
- Simon Rottenberg (1965), Ph.D. (Harvard)
Professor of Economics 1601 Hermitage Court
- John E. Roueché, Jr. (1969), Ph.D. (Florida State)
Adjunct Associate Professor of Education 2905 Friendship Road
- †Peter Brock Rowe (1968), MRACP (Royal Australasian College of Physicians)
Assistant Professor of Medicine 206 Parthenia Drive
- David T. Rowlands, Jr. (1966), M.D. (Pennsylvania)
Associate Professor of Pathology 1100 Leon Street, Apt. 3
- Donald Francis Roy (1950), Ph.D. (Chicago)
Professor of Sociology 604 North Gregson Street
- John Jesse Rudin, II (1945), B.D., Ph.D. (Northwestern)
Associate Professor of Christian Communications 1640 Marion Street
- Julian Meade Ruffin (1930), M.D. (Virginia)
Professor of Medicine 816 Anderson Street
- Ralph Wayne Rundles (1945), M.D. (Duke), Ph.D. (Cornell)
Professor of Medicine 132 Pinecrest Road
- Jerome Ruskin (1967), M.D. (Albert Einstein School of Medicine)
Assistant Professor in Medicine 709 Ferris Road
- Jerome E. Rygorsky (1968), M.D. (Columbia)
Associate in Medicine 527 Green Street
- David Coston Sabiston, Jr. (1964), M.D. (Johns Hopkins)
Professor of Surgery 1528 Pinecrest Road
- Anne E. Sagburg, M.D. (Oslo)
Associate in Psychiatry Asheville, North Carolina
- Harvey J. Sage (1964), Ph.D. (Yale)
Assistant Professor of Pathology and
Assistant Professor of Biochemistry 30 A Valley Terrace
- †Andrew J. Saladino (1968), M.D. (Georgetown Univ. College of Medicine)
Associate in Pathology 5-B Triangle Apartments, Kerley Road
- §Stephen J. Salchenberger (1967), Ph.D. (Johns Hopkins)
Assistant Professor of Romance Languages 1911 House Avenue, Apt. 41
- Herman Salinger (1955), Ph.D. (Yale)
Professor of German 3444 Rugby Road
- Jay S. Salkin (1969), Ph.D. (Northwestern)
Assistant Professor of Economics 3109 Ithaca
- Herbert A. Saltzman (1958), M.D. (Philadelphia)
Professor of Medicine 2728 McDowell Street
- John Salzano (1958), Ph.D. (Iowa State)
Associate Professor of Physiology 607 Starmont Drive
- Aaron P. Sanders (1956), Ph.D. (North Carolina)
Associate Professor of Radiology and Assistant Professor
of Physiology Triangle Apartments 12-C
- Charles Richard Sanders (1937), Ph.D. (Chicago)
Professor of English 103 Pinecrest Road
- Baxter B. Sapp, Jr. (1960), D.D.S. (Temple)
Associate in Dentistry 3514 Rugby Road
- Eugenia Curtis Saville (1947), M.A. (Columbia)
Associate Professor of Music 1103 Anderson Street

†Through 2-28-69.

‡Through 7-15-69.

§Through 8-31-69.

- Lloyd Blackstone Saville (1946), Ph.D. (Columbia)
Professor of Economics 1103 Anderson Street
- Saul M. Schanberg (1967), Ph.D., M.D. (Yale)
Assistant Professor of Neurology and
Associate Professor of Pharmacology 2516 Sevier Street
- *Harold Schiffman (1963), Ph.D. (Princeton)
Associate Professor of Psychology 3415 Hope Valley Road
- Anton Schindler (1968), Ph.D. (Vienna)
Adjunct Professor of Chemistry 1612 Kent Street
- Bruce M. Schlein (1969), M.D. (New York State)
Assistant Professor of Pathology 1023 Sycamore Street
- Michael Schlesinger (1969), M.D. (Hebrew Univ., Israel)
Visiting Professor of Immunology 1200 Leon Street
 Apartment C-1
- Knut Schmidt-Nielsen (1952), Ph.D. (Copenhagen)
James B. Duke Professor of Physiology % Zoology Department
in the Department of Zoology Duke University
- David W. Schomberg (1968), Ph.D. (Purdue)
Assistant Professor of Obstetrics and Gynecology and
Assistant Professor of Physiology 76-C Colonial Apartments
- Kenneth J. Schoonhagen (1969), M.H.A. (Duke)
Instructor of Graduate Programs in Hospital
Administration 4312 Samoa Court
- †Daniel M. Schores (1965), Ph.D. (Missouri)
Assistant Professor of Church and Society 2502 Tryon Road
- David P. Schorr, Jr. (1961), M.A.T. (Duke)
Instructor in Mathematics 104 Laurel Hill Road
 Chapel Hill, N. C.
- Robert S. Schoshinski (1969), LL.M. (Georgetown)
Visiting Professor of Law 2411 Prince Street
- Esther Louise Schwerman (1947), Ph.D. (Northwestern)
Assistant Professor of English 909 Lambeth Circle
- Anne Firor Scott (1961), Ph.D. (Radcliffe)
Associate Professor of History 1028 Highland Woods
 Chapel Hill, N. C.
- James F. Scott, Jr. (1969), B.S. (North Carolina State)
Associate Professor of Aerospace Studies 1730 Euclid Road
 Parkwood, N. C.
- William Evans Scott (1958), Ph.D. (Yale)
Associate Professor of History 1311 Dollar Avenue
- Richard A. Scoville (1961), Ph.D. (Yale)
Assistant Professor of Mathematics 2114 Sprunt Street
- Judy Harrington Seaber (1969), B.A. (Emory)
Associate in Ophthalmology Richmond Downs
 Hillsborough, N. C.
- Will Camp Sealy (1946), M.D. (Emory)
Professor of Thoracic Surgery 2232 Cranford Road
- Richard B. Searles (1965), Ph.D. (California)
Associate Professor of Botany 1708 Bedford Street
- Sandra Seeber (1968), M.A. (Duke)
Temporary Instructor in English Apartment C
 854 Louise Circle
- Hilliard Foster Seigler (1967), M.D. (North Carolina)
Assistant Professor of Surgery and Assistant Professor
of Immunology 4006 King Charles Street
- James Hustead Semans (1953), M.D. (Johns Hopkins)
Professor of Urology 1415 Bivins Street
- Stuart M. Sessoms (1968), M.D. (Medical College of Virginia)
Professor of Medicine 2750 McDowell Street

*Sabbatical leave fall 1969; leave of absence spring 1970.

†Through 8-31-69.

- Walter E. Sewell (1965), Ph.D. (Harvard)
Adjunct Professor of Mathematics 2243 Cranford Road
- James Kermit Sexton (1969), M.D. (Bowman Gray)
Associate in Radiology 3314 Pinafore Drive
- James Lewis Shaffland (1969), Ph.D. (Chicago)
Assistant Professor of Anatomy 808 Green Street, C-3
- Maxwell E. Shauck, Jr. (1968), Ph.D. (Tulane)
Assistant Professor of Mathematics 807 Onslow Street
- Mary E. Shaughnessy (1969), M.S. (Simmons)
Associate Professor of Nursing 1829 Front Street
 Apartment D-5
- Marion L. Shepard (1967), Ph.D. (Iowa State)
Assistant Professor of Mechanical Engineering 3421 Pinafore Drive
- Bobby Foster Sherwood (1965), D.V.M. (Georgia)
Assistant Professor in Veterinary Medicine 5020 Autumn Drive
- Melvin G. Shimm (1953), LL.B. (Yale)
Professor of Law 2429 Wrightwood Avenue
- William Warner Shingleton (1947), M.D. (Bowman Gray)
Professor of Surgery 3866 Somerset Drive
- *Joseph Robert Shoenfield (1952), Ph.D. (Michigan)
Professor of Mathematics 1700 Hillcrest Drive
- Marvin J. Short (1967), M.D. (Duke)
Assistant Professor of Psychiatry 2849 Friendship Road
- William Derek Shows (1967), Ph.D. (Duke)
*Assistant Professor of Medical Psychology in the Department of
 Psychiatry; Lecturer in Department of Religion; and Lecturer
 in Department of Psychology* 2106 Englewood Avenue
- R. Baird Shuman (1962), Ph.D. (Pennsylvania)
Professor of Education P. O. Box 6696
- James B. Sidbury (1961), M.D. (Columbia)
Professor of Pediatrics 4044 Nottaway Road
- Lewis Siegel (1968), Ph.D. (Johns Hopkins)
Assistant Professor of Biochemistry 3006 Glendale Avenue
- Herbert O. Sieker (1955), M.D. (Washington)
Professor of Medicine 3949 Plymouth Road
- †Bernard Silberman (1967), Ph.D. (Michigan)
Professor of History 14 Heath Place
- Harold R. Silberman (1962), M.D. (Washington)
Associate Professor of Medicine 2718 Princeton Drive
- Donald Silver (1964), M.D. (Duke)
*Associate Professor of Surgery and Associate Professor
 of Pediatrics* 2419 Alpine Road
- George Addison Silver, III (1946), M.D. (Duke)
Associate Professor of Psychiatry 3910 Dover Road
- †William Hays Simpson (1930), Ph.D. (Duke)
Professor of Political Science 1406 Dollar Avenue
- Leroy C. Skinner (1959), M.A. (Maryland)
Associate Professor of Physical Education 2018 Sunset Avenue
- Ronald J. Slinn (1969), Ph.D. (Duke)
Associate Professor of Forest Economics 910 W. Markham Avenue
- †David Alexander Smith (1962), Ph.D. (Yale)
Associate Professor of Mathematics 2032 West Club Boulevard
- *Sabbatical leave 1969-70.
 †Leave of absence 1969-70.
 ‡Sabbatical leave fall semester 1969-70.

- Dwight Moody Smith, Jr. (1965), Ph.D. (Yale)
Associate Professor of New Testament Interpretation 2728 Spencer Street
- §Donald S. Smith, II (1961), M.H.A. (Minnesota)
Assistant Professor of Hospital Administration Atlas & Elba Streets
 Apartment 4
- Grover C. Smith (1952), Ph.D. (Columbia)
Professor of English 215 W. Woodridge Drive
- Harmon L. Smith (1959), B.D., Ph.D. (Duke)
Associate Professor of Moral Theology 601 East Markham Avenue
- James B. Smith, Jr. (1969), M.M. (Union Theological Seminary)
Assistant Professor of Music and Director of Chapel Music and Choral Conductor 1829 Front Street, G-12
- James Tucker Smith (1969), M.D. (Kansas)
Associate in Radiology 1100 Leon Street
 Apartment 18
- Joel Smith (1958), Ph.D. (Northwestern)
Professor of Sociology 2712 Sevier Street
- L. P. Smith (1967), M.S. (Massachusetts Institute of Technology)
Instructor in Mathematics 3505 Rugby Road
- Peter Smith (1959), Ph.D. (Cantab.)
Associate Professor of Chemistry 2711 Circle Drive
- Sandra C. Smith (1967), B.S. (North Carolina)
Instructor in Nursing Route 3, Box 169
 Chapel Hill, N. C.
- Wirt W. Smith (1957), M.D. (Texas)
Associate Professor of Experimental Surgery 3301 Surrey Road
- Ralph E. Snider (1960), D.D.S. (Ohio State)
Associate in Dentistry 2417 Bruton Road
- George G. Somjen (1963), M.D. (Amsterdam)
Associate Professor of Physiology and Lecturer in Department of Psychology 606 Buchanan Boulevard
- Joachim R. Sommer (1957), M.D. (Munich)
Associate Professor of Pathology 2724 Sevier Street
- Joanne G. Southworth (1967), Ph.D. (Medical College of Virginia)
Assistant Professor of Immunology Route 3, Box 156, Hillsborough, N. C.
- Madison S. Spach (1958), M.D. (Duke)
Professor of Pediatrics 2632 McDowell Street
- Dorothy Spangler (1954), M.A. (North Carolina)
Associate Professor of Physical Education 2729 Brown Avenue
- Bertel M. Sparks (1966), S.J.D. (Michigan)
Professor of Law 67D Colonial Apartments
- Robert L. Spaulding (1965), Ph.D. (Stanford)
Associate Professor of Education 1516 Woodburn Road
- Joseph John Spengler (1934), Ph.D. (Ohio State), D.Hu.L.
James B. Duke Professor of Economics 2240 Cranford Road
- Alexander Spock (1962), M.D. (Maryland)
Associate Professor of Pediatrics 2414 West Club Boulevard
- William C. Spong (1968), Th.M. (Duke)
Instructor in Clinical Pastoral Education 713 W. Cornwallis Road
- George H. Spooner (1965), Ph.D. (North Carolina)
Assistant Professor of Clinical Pathology 318 Severin Street
 Chapel Hill, N. C.
- Thomas Spragens (1968), Ph.D. (Duke)
Assistant Professor of Political Science Apartment B-1
 812 Green Street
- David Squire (1962), Ph.D. (Rice)
Visiting Assistant Professor of Chemistry 3509 Westover Road

§Sabbatical leave 1969-70.

‡Olaf Stackelberg (1963), Ph.D. (Minnesota)	
Associate Professor of Mathematics	2101 W. Club Boulevard
John Staddon (1967), Ph.D. (Harvard)	
Associate Professor of Psychology	2719 McDowell Street
Lucia A. Stadter (1969), M.A. (Italy)	1207 Le Clair Street
Visiting Assistant Professor of Romance Languages	Chapel Hill, N. C.
William J. Stambaugh (1961), Ph.D. (Yale)	
Associate Professor of Forest Pathology	3211 Sherbon Drive
D. Keith Stanley, Jr. (1961), Ph.D. (Johns Hopkins)	
Assistant Professor of Classical Studies	C-12 Croasdaile Apartments
*James L. Stanley (1966), B.A. (Syracuse)	
Professor of Aerospace Studies	5204 Newhall Road
Charles Frank Starmer (1966), Ph.D. (North Carolina)	
Assistant Professor of Computer Science in the	
Department of Medicine and Assistant Professor of	
Community Health Sciences	1209 Oakland Avenue
W. K. Stars (1966), M.A. (North Carolina)	
Lecturer in Art	1916 Glendale Avenue
Eugene Anson Stead, Jr (1947), M.D. (Emory)	
Florence McAlister Professor of Medicine	2122 Campus Drive
Unnsteinn Stefansson (1965), Ph.D. (Copenhagen)	
Adjunct Professor of Zoology	Duke Marine Laboratory, Beaufort, N. C.
Henry R. Stern (1968), Ph.D. (Northwestern)	
Assistant Professor of German	706 Louise Circle
Lionel Stevenson (1955), Ph.D. (California), F.R.S.L	
James B. Duke Professor of English	3106 Devon Road
Delford L. Stickel (1962), M.D. (Duke)	
Associate Professor of Surgery	3108 Devon Road
William Frank Stinespring (1936), Ph.D. (Yale)	
Professor of Old Testament and Semitics	1107 Watts Street
Donald E. Stone (1963), Ph.D. (California)	
Associate Professor of Botany	2706 Spencer Street
Peter Stone (1969), M.A. (Chicago)	RFD 8, Box 389
Visiting Assistant Professor of Anthropology	Infinity Road
Virginia Stone (1966), Ph.D. (North Carolina)	
Professor of Nursing	1829 Front Street, Apt. 3A
Boyd R. Strain (1969), Ph.D. (California at Los Angeles)	
Associate Professor of Botany	122 Brenrose Circle
Victor H. Strandberg (1966), Ph.D. (Brown)	
Associate Professor of English	2709 Augusta Drive
John Stratton (1969), M.D. (Harvard)	
Associate in Department Community Health Sciences	2803 Harriman Avenue
‡Jeanette Straub (1966), M.A. (Duke)	
Assistant Professor of Nursing	2020 Pershing Street
Howard A. Strobel (1948), Ph.D. (Brown)	
Professor of Chemistry	1119 Woodburn Road
‡John W. Strong (1966), LL.B. (Illinois)	
Professor of Law	1125 Anderson Street
*Margretta M. Styles (1968), Ed.D. (Yale)	
Associate Professor of Nursing	5314 Beaumont Drive
*Through 8-31-69.	
‡Through 5-31-69.	
‡Leave of absence 1969-70.	

- Henry L. Sublett, Jr. (1962), Ed.D. (Virginia)
Associate Professor of Education 2710 Montgomery Street
- Herbert P. Sullivan (1960), Ph.D. (Durham, England)
Associate Professor of Religion and
Lecturer in History of Religions 4011 Deepwood Circle
- *Elizabeth Read Sunderland (1939-42; 1943), Ph.D. (Radcliffe)
Associate Professor of Art 6416 College Station
 Route 1, Box 428
- John Sutherland (1969), Ph.D. (California at Berkeley)
Assistant Professor of Zoology Beaufort, North Carolina
- Louis Earl Swanson (1949), A.B. (Hamline)
Associate Professor of Hospital Administration 2418 Wrightwood Avenue
- John Sykes (1968), Ph. D. (Birmingham)
Assistant Professor of Physics 408 Hammond Street
- Geraldine Talarczyk (1968), M.S. (Wisconsin)
Instructor in Nursing Apartment E-62
 2112 Broad Street
- Elizabeth Bullock Talbot (1968), M.M. (North Carolina)
Instructor in Music 206 Cottage Lane
 Chapel Hill, N. C.
- Ingeborg Hildebrand Talton (1968), M.D. (Medical School, Giessen, Germany)
Assistant Professor of Anesthesiology 2406 Tampa Avenue
- Charles Tanford (1960), Ph.D. (Princeton)
Professor of Physical Biochemistry Apartment 49
 1000 N. Duke Street
- Shanti S. Tangri (1969), Ph.D. (California)
Visiting Associate Professor of Economics Apartment 23
 1000 N. Duke Street
- Robert S. Tate, Jr. (1965), Ph.D. (Indiana)
Assistant Professor of Romance Languages 2311 Prince Street
- Catherine Taylor (1969), M.D. (Tennessee College of Medicine)
Associate in Psychiatry 69 Hamilton
 Chapel Hill, N. C.
- John TePaske (1967), Ph.D. (Duke)
Professor of History 15 Heath Place
- Marcel Tétel (1960), Ph.D. (Wisconsin)
Professor of Romance Languages 1804 Woodburn Road
- William L. Thach (1968), B.A. (College of William & Mary)
Assistant Professor in Naval Science 2304 North Duke Street
- Erich F. P. Thaller (1969), Ph.D. (Graz Univ., Austria)
Visiting Assistant Professor of German 2203 Lafayette Street
- †O. Allen Thiher, Jr. (1967), M.A. (Wisconsin)
Assistant Professor of Romance Languages 10A Colonial Apts.
- Norman C. Thomas (1969), Ph.D. (Princeton)
Professor of Political Science 2740 Spencer Street
- Walter Lee Thomas, Jr. (1932-35; 1937-42; 1945), M.D. (Virginia)
Professor of Obstetrics and Gynecology 3619 Dover Road
- Edgar Tristram Thompson (1935), Ph.D. (Chicago)
Professor of Sociology 138 Pinecrest Road
- Howard K. Thompson (1962), M.D. (Columbia)
Associate Professor of Medicine and Associate Professor of
Biomathematics 1639 Marion Street
- Larry W. Thompson (1961), Ph.D. (Florida State)
Associate Professor of Medical Psychology in Department of
Psychiatry and Lecturer in Psychology 3408 Hope Valley Road
- Lawrence K. Thompson, III (1969), M.D. (Duke)
Assistant Professor of Plastic Surgery 3606 Wateredge Drive
- Robert L. Thompson (1968), Ed.D. (Duke)
Associate in Community Health Sciences 2618 Pickett Road

*Sabbatical leave fall semester 1969-70.

†Through 8-31-69.

- *Robert W. Thompson (1966), B.S. (Maryland)
Assistant Professor of Air Force Aerospace Studies 126 Larkspur Circle
- Earlie Endris Thorpe (1969), Ph.D. (Ohio State)
Adjunct Professor of Christianity and Culture 164 Oakmont Avenue
- Fredrick L. Thurstone (1967), Ph.D. (North Carolina State)
Associate Professor of Electrical Engineering and
Associate Professor of Biomedical Engineering 2532 Sevier Street
- John P. Tindall (1966), M.D. (Duke)
Assistant Professor of Dermatology 4039 King Charles Road
- Edward A. Tiryakian (1965), Ph.D. (Harvard)
Professor of Sociology 1523 Hermitage Court
- C. Craig Tisher (1969), M.D. (Washington Univ.)
Assistant Professor of Medicine and
Assistant Professor of Pathology 3825 Nottaway Road
- Bert R. Titus (1961), C.P.O.
Assistant Professor of Orthosis and Prosthesis 225 West Woodridge Drive
- Russell F. Tomlinson (1962), Ph.D. (Florida)
Assistant Professor of Medical Psychology in
Department of Psychiatry 410 Ridgefield Road
 Chapel Hill, N. C.
- E. Clifford Toren, Jr. (1961), Ph.D. (Illinois)
Associate Professor of Chemistry Route 3
 Hillsborough, N. C.
- Elias Torre (1951), Doctor en Filosofía y Letras (Madrid)
Associate Professor of Romance Languages 1121 Anderson Street
- Daniel C. Tosteson (1961), M.D. (Harvard)
Professor of Physiology 321 Burlage Circle
 Chapel Hill, N. C.
- Ara Y. Tourian (1969), B.S. (Univ. of Beirut)
Assistant Professor of Neurology 1018 Demerius
- V. G. Treml (1967), Ph.D. (North Carolina)
Associate Professor of Economics 603 Long Leaf Drive
 Chapel Hill, N. C.
- Philip H. Trickey (1965), M.S.E.E. (Maine)
Visiting Professor of Electrical Engineering 112 W. Lavender Street
- †William G. Troyer (1965), M.D. (Oklahoma)
Associate in Medicine Walter Reed Hospital
 Washington, D. C.
- James Nardin Truesdale (1930), Ph.D. (Duke)
Professor of Greek 105 Pinecrest Road
- Benjamin F. Trump (1965), M.D. (Kansas)
Professor of Pathology 1600 Anderson Street Apartments
 Apartment 1D
- Gene M. Tucker (1966), Ph.D. (Yale)
Associate Professor of Old Testament 2210 Arrington Street
- Vance Tucker (1964), Ph.D. (California)
Associate Professor of Zoology 412 Swift Avenue
- Roger W. Turkington (1968), M.D. (Harvard)
Assistant Professor of Medicine and Assistant Professor of
Biochemistry 2617 Princeton Drive
- Arlin Turner (1953), Ph.D. (Texas)
Professor of English 1115 Woodburn Road
- †Violet Horner Turner (1943), M.D. (Chicago)
Assistant Professor of Obstetrics and Gynecology 2106 Summit Avenue
- §Richard Lovejoy Tuthill (1953), Ed.D. (Columbia)
Professor of Geography in the Faculty of Arts and Sciences 2709 Dogwood Road

*Through 8-31-69.

†Through 10-23-69.

‡Leave of absence 1969-70.

§Sabbatical leave 1969-70.

Carol Ruth Tyler (1968), M.S.N. (Duke)	1100 Leon Street, Apartment 1
<i>Instructor in Nursing</i>	
Malcolm P. Tyor (1955), M.D. (Duke)	810 East Forest Hills Boulevard
<i>Professor of Medicine</i>	
Raymond U (1967), M.S. (Northern Illinois)	2112 Broad Street
<i>Associate in Radiology</i>	
Stephen Uhalley, Jr. (1968), Ph.D. (California at Berkeley)	2432 Tryon Road
<i>Associate Professor of History</i>	
Luella Jane Uhrhane (1947), M.P.H. (North Carolina)	2712 Circle Drive
<i>Associate Professor of Health Education</i>	
Helen Ullrich (1968), Ph.D. (Michigan)	1408 Duke University Road
<i>Assistant Professor of Linguistics in the Department of Slavic Languages and Literatures and Assistant Professor of Anthropology</i>	
James R. Urbaniak (1969), M.D. (Duke)	1305 Wildwood Drive
<i>Assistant Professor of Orthopaedics</i>	Chapel Hill
Javad Vakilzadeh (1968), D.V.M. (Tehran)	1702 Woodburn Road
<i>Associate in Veterinary Medicine</i>	
William W. Van Alstyne (1964), LL.B. (Stanford)	2617 McDowell Street
<i>Professor of Law</i>	
†Eugene F. Van Epps (1968), M.D. (Iowa)	28 Lebanon Circle
<i>Professor of Radiology</i>	
§Robert van Kluyve (1962), Ph.D. (Johns Hopkins)	1533 Hermitage Court
<i>Associate Professor of English</i>	
Vartan Vartanian (1961), M.D. (Cluj, Rumania)	1426 Colewood Drive
<i>Associate Professor of Anesthesiology</i>	
Thomas J. Vaughan (1969), M.D. (Medical College of Virginia)	4300 Erwin Road
<i>Associate in Radiology</i>	
Gerald Lynn Vaughn (1969), M.S. (Duke)	1707 Woodburn Road
<i>Temporary Instructor of Zoology</i>	
Jacinto J. Vazquez (1963), M.D. (Havana)	1707 Woodburn Road
<i>Professor of Pathology</i>	
Martha Delia Vazquez (1963), M.D. (Havana)	Duke University Marine Laboratory
<i>Assistant Professor of Pathology</i>	Beaufort, N. C.
*F. John Vernberg (1951), Ph.D. (Purdue)	3109 Ithaca Street
<i>Professor of Zoology</i>	
†John M. Vernon (1966), Ph.D. (Massachusetts Institute of Technology)	Route 1, Kerley Road
<i>Associate Professor of Economics</i>	
Adriaan Verwoerd (1962), M.D. (Amsterdam)	1722 Duke University Road
<i>Associate Professor of Psychiatry</i>	
Aleksandar S. Vesić (1964), D.Sc. (Belgrade)	2606 University Drive
<i>Professor of Civil Engineering</i>	
Lois Vick (1967), M.A.T. (Duke)	2041 Cornwallis Road
<i>Lecturer in English</i>	
Elia E. Villanueva (1969), M.A. (Duke)	1635 Marion Avenue
<i>Assistant Professor of Physical Therapy</i>	Route 1, Box 307-1
Patrick R. Vincent (1954), Ph.D. (Johns Hopkins)	Murphy School Road
<i>Associate Professor of Romance Languages</i>	
F. Stephen Vogel (1961), M.D. (Western Reserve)	
<i>Professor of Pathology</i>	

*Through 6-30-69.

†Leave of absence 1969-70.

‡Through 8-31-69.

§Through 8-31-69

- Steven Vogel (1966), Ph.D. (Harvard)
Assistant Professor of Zoology 1212 Woodburn Road
- Louis D. Volpp (1967), Ph.D. (State Univ. of Iowa)
Professor of Business Administration 5312 Yardley Terrace
- Fred M. Vukovich (1967), Ph.D. (St. Louis)
Adjunct Associate Professor of Forest Meteorology 5713 Rangley Drive
 Raleigh, N. C.
- Howard Wachtel (1968), Ph.D. (New York)
Assistant Professor of Biomedical Engineering and Assistant Professor of Physiology 3212 Sherbon Drive
- Joseph A. C. Wadsworth (1965), M.D. (Duke)
Professor of Ophthalmology 1532 Pinecrest Road
- John P. Waggoner, Jr. (1957), B.D. (Duke), B.S. in L.S. (North Carolina)
Associate Professor in the Faculty of Arts and Sciences and Associate Librarian 2812 Devon Road
- Frederick R. Wagner (1968), M.A. (Duke)
Temporary Instructor in English Box 4607 Duke Station
- Stephen A. Wainwright (1964), Ph.D. (California at Berkeley)
Associate Professor of Zoology 3812 Dover Road
- †Salih J. Wakil (1959), Ph.D. (Washington)
Professor of Biochemistry 2527 Sevier Street
- Preston Walker (1967), M.D. (Medical College of South Carolina)
Associate in Psychiatry 5207 Hawkesbury Lane, Raleigh, N. C.
- Andrew G. Wallace (1964), M.D. (Duke)
Associate Professor of Medicine and Assistant Professor of Physiology 3413 Rugby Road
- Michael A. Wallach (1962), Ph.D. (Harvard)
Professor of Psychology 2406 North Duke Street
- Richard L. Walter (1962), Ph.D. (Notre Dame)
Associate Professor of Physics 1614 Woodburn Road
- Hsioh-Shan Wang (1965), M.B. (National Taiwan University Medical College)
Assistant Professor of Psychiatry 607 Central Avenue, Butner, N. C.
- Paul P. Wang (1968), Ph.D. (Ohio State)
Assistant Professor of Electrical Engineering 203 Landsbury Road
- Calvin Lucian Ward (1952), Ph.D. (Texas)
Associate Professor of Zoology 1726 Duke University Road
- Frances Ward (1969), Ph.D. (Brown)
Assistant Professor of Immunology and Assistant Professor of Experimental Surgery 5 Ashley Road
- Bruce W. Wardropper (1962), Ph.D. (Pennsylvania)
William H. Wannamaker Professor of Romance Languages 3443 Rugby Road
- *Seth L. Warner (1955), Ph.D. (Harvard)
Professor of Mathematics 2406 Wrightwood Avenue
- Richard Lyness Watson, Jr. (1939), Ph.D. (Yale)
Professor of History 109 Pinecrest Road
- Peter Weigl (1968), A.B. (Williams)
Temporary Instructor in Zoology 2222 Lafayette Street
- Morris Weisfeld (1967), Ph.D. (Yale)
Professor of Mathematics 2100 House Avenue
- John C. Weistart (1969), J.D. (Duke)
Assistant Professor of Law
- Henry Weitz (1950), Ed.D. (Rutgers)
Professor of Education 2716 Circle Drive

*Leave of absence 1970-71.

†Sabbatical leave spring semester 1968-69.

- Bruce A. Wells (1964), M.S.E.E. (Oregon State)
Associate Professor of Electrical Engineering 2729 Montgomery Street
 Box 225, Route 1
 Richard L. Wells (1962), Ph.D. (Indiana)
Associate Professor of Chemistry Randolph Road
 Paul Welsh (1948), Ph.D. (Cornell)
Professor of Philosophy 2749 Dogwood Road
 Daniel P. Werner (1968), Ph.D. (Michigan)
Assistant Professor of Mechanical Engineering 48-B Colonial Apartments
 Lana H. Wertz (1968), B.A. (DePauw)
Temporary Instructor in German 912 Buchanan Boulevard
 Martha L. Wertz (1960), M.S.W. (Tulane)
Assistant Professor of Psychiatric Social Work 2717 Augusta Drive
 Joel J. West (1967), M.D. (Northwestern)
Assistant Professor of Medicine 2716 Augusta Drive
 Joseph Cable Wetherby (1947), M.A. (Wayne)
Associate Professor of English 2604 Sevier Street
 Robert Whalen (1961), M.D. (Cornell)
Associate Professor of Medicine 3509 Westover Road
 Robert W. Wheat (1958), Ph.D. (Washington)
Associate Professor of Microbiology
and Assistant Professor of Biochemistry 2720 Montgomery Street
 Fred M. White (1959), M.F. (Duke)
Assistant Professor of Silviculture 3323 Rolling Hills Road
 †Richard Alan White (1963), Ph.D. (Michigan)
Associate Professor of Botany 215 Fleming Drive
 Willamay Whitner (1969), Ed.D. (Columbia)
Associate Professor in Nursing Research 122 Landsbury Road
 George D. Wilbanks (1964), M.D. (Duke)
Assistant Professor of Obstetrics and Gynecology 3615 Dover Road
 Karl Milton Wilbur (1946), Ph.D. (Pennsylvania)
James B. Duke Professor of Zoology 2404 Bruton Road
 Robert L. Wilbur (1957), Ph.D. (Michigan)
Associate Professor of Botany 2613 Stuart Drive
 Pelham Wilder, Jr. (1949), Ph.D. (Harvard)
Professor of Chemistry and Professor of Pharmacology
in Department of Physiology and Pharmacology 2514 Wrightwood Avenue
 Catherine M. Wilfert (1969), M.D. (Harvard)
Assistant Professor of Pediatrics 1312 Georgia Avenue
 Mason Wilkins (1969), M.D. (Bowman Gray)
Associate in Community Health Sciences 5 Lucerne Lane
 Robert Henry Wilkins (1968), M.D. (Pittsburgh)
Assistant Professor of Neurosurgery in Department of
Surgery 3726 Bentley Drive
 Robert H. Wilkinson (1967), M.D. (Washington Univ.)
Assistant Professor in Radiology 3519 Courtland Drive
 William E. Wilkinson (1967), B.S. (Davidson)
Assistant Professor of Mathematics P. O. Box 836
 Chapel Hill, N. C.
 Hilda Pope Willett (1948), Ph.D. (Duke)
Professor of Bacteriology 901 Wakestone Court
 Raleigh, N. C.
 *Trevor Williams (1965), Sc.D. (Johns Hopkins)
Associate Professor of Mathematics and Associate Professor
of Community Health Sciences % Mathematics Department

*Through 8-31-69.

†Sabbatical leave 1969-70.

George Walton Williams (1957), Ph.D. (Virginia)	
<i>Professor of English</i>	6 Sylvan Road
†Donald S. Williamson (1966), Ph.D. (Northwestern)	
<i>Associate Professor of Pastoral Psychology</i>	2713 Augusta Drive
William Hailey Willis (1963), Ph.D. (Yale)	
<i>Professor of Greek in Department of Classical Studies</i>	1419 Dollar Avenue
James F. Wilson (1967), Ph.D. (Ohio State)	
<i>Assistant Professor of Civil Engineering</i>	3523 Racine Street
James W. Wilson (1969), Ph.D. (Kentucky)	
<i>Associate in Pathology</i>	2711 Oberlin Drive
John Wilson (1968), D.Phil. (Oxon.)	
<i>Visiting Assistant Professor of Sociology and Anthropology</i>	2017 Englewood Avenue
†Neil L. Wilson (1957), Ph.D. (Yale)	
<i>Professor of Philosophy</i>	Route 2, Milton Road
Ruby Wilson (1959), M.S.N. (Western Reserve)	
<i>Assistant Professor of Nursing and Associate in Medicine</i>	3006 University Drive
Thomas G. Wilson (1959), Sc.D. (Harvard)	
<i>Professor of Electrical Engineering</i>	2721 Sevier Street
William P. Wilson (1961), M.D. (Duke)	
<i>Professor of Psychiatry</i>	1209 Virginia Avenue
Cliff W. Wing, Jr. (1965), Ph.D. (Tulane)	
<i>Associate Professor of Psychology</i>	2722 Spencer Street
*Stefan S. Winkler (1966), M.D. (Tufts)	
<i>Associate in Radiology</i>	231 Forestwood Drive
Orval S. Wintermute (1958), B.D., Ph.D. (Johns Hopkins)	
<i>Associate Professor of Religion and Lecturer in Old Testament</i>	1103 North Duke Street
Loren Ralph Withers (1949), M.S. (Juilliard)	
<i>Associate Professor of Music</i>	2741 Dogwood Road
Benjamin Wittels (1961), M.D. (Minnesota)	
<i>Associate Professor of Pathology</i>	2308 Prince Street
Ellen W. Wittig (1969), Ph.D. (Cornell)	1G Towne House Apartments
<i>Temporary Instructor of English</i>	Chapel Hill, N. C.
Myron L. Wolbarsht (1968), Ph.D. (Johns Hopkins)	
<i>Professor of Ophthalmology and Associate Professor of Physiology</i>	1435 Acadia Street
C. Hilburn Womble (1958), Ph.D. (Johns Hopkins)	
<i>Associate Professor of Latin</i>	921 Green Street
Max Atkin Woodbury (1966), Ph.D. (Michigan)	
<i>Professor of Mathematics and Professor of Biomathematics</i>	4008 Bristol Road
Barnes Woodhall (1937-43; 1945), M.D. (Johns Hopkins)	
<i>James B. Duke Professor of Neurosurgery</i>	4006 Dover Road
§Frank W. Woods (1958), Ph.D. (Tennessee)	
<i>Associate Professor of Forest Ecology</i>	1509 Pinecrest Road
||Robert Hilliard Woody (1929), Ph.D. (Duke)	
<i>Professor of History</i>	2734 Circle Drive
Alma Lorraine Woodyard (1954), M.Ed. (North Carolina at Greensboro)	
<i>Assistant Professor of Physical Education</i>	880 Louise Circle

*Through 6-30-69.

†Through 8-31-69.

‡Through 8-31-69.

§Through 8-31-69.

||Leave of absence fall semester 1969-70.

Boyd T. Worde (1958), M.D. (Tennessee)	
<i>Associate Professor of Radiology</i>	2512 Sevier Street
Samuel N. Workman (1967), M.D. (Medical College of South Carolina)	
<i>Assistant Professor of Psychiatry</i>	Asheville, N. C.
§Jimmie J. Wortman (1967), Ph.D. (Duke)	
<i>Adjunct Assistant Professor of Electrical Engineering</i>	1712 Euclid Road
Paul M. Wortman (1967), Ph.D. (Carnegie-Mellon)	Route 1, Box 313A
<i>Assistant Professor of Psychology</i>	Linden Road
Julia Ann Hedgepeth Wray (1955), M.F.A. (North Carolina at Greensboro)	
<i>Assistant Professor of Physical Education</i>	911 Carver Street
Donald Wright (1967), Ph.D. (Duke)	
<i>Assistant Professor of Mechanical Engineering</i>	Route 2, Highland Drive
James B. Wyngaarden (1956-65; 1967), M.D. (Michigan)	
<i>Hanes Professor of Medicine</i>	707 Morehead Avenue
*Alvin J. Wyrick (1966), B.S.E.E. (Tennessee)	
<i>Associate in Radiology</i>	Box 3223, Duke Station
David O. Yandle (1967), Ph.D. (North Carolina State)	
<i>Associate Professor of Forest Mathematics</i>	2400 Tampa Avenue
†William P. Yohe (1958), Ph.D. (Michigan)	
<i>Professor of Economics</i>	2021 Dartmouth Drive
Charles R. Young (1954), Ph.D. (Cornell)	
<i>Associate Professor of History</i>	2929 Welcome Drive
David L. Young (1968), M.D. (Texas)	
<i>Assistant Professor of Medicine</i>	3504 Stoneybrook Drive
Franklin W. Young (1968), Ph.D. (Duke)	Apartment B
<i>Professor of New Testament in Divinity School</i>	804 Berkeley Street
Helen Rose Young (1957), M.S. (William and Mary)	
<i>Assistant Professor of Nursing</i>	5400 Newhall Road
Paul Young (1956), M.A. (Illinois)	
<i>Professor in the Faculty of Arts and Sciences</i>	1110 Shepherd Street
W. Glenn Young, Jr. (1954), M.D. (Duke)	
<i>Professor of Surgery</i>	3718 Eton Road
Chester M. Zmijewski (1963), Ph.D. (Buffalo)	
<i>Associate Professor of Immunology</i>	3614 Westover Road
William W. K. Zung (1966), M.D. (Texas)	
<i>Assistant Professor of Psychiatry</i>	203 Dacian Avenue

Part-Time Instructional Staff

Kenneth C. Abernethy, M. A.	
<i>Mathematics</i>	2625 Lombard Avenue
Lawrence Ashley, B.A.	
<i>Philosophy</i>	2720 Brown Avenue
Nicolas Atkins, B.A.	
<i>Slavic Languages and Literatures</i>	2017 Chapel Hill Road
Edward Bean, M.A.	
<i>Romance Languages</i>	1802 Forest Road
†Tom Boyd, B.S.	1106 Douglas Street
<i>Management Sciences</i>	Apartment A-306

*Through 6-30-69.

†Leave of absence 1969-70.

‡Through 11-30-69.

§Through 1-31-69.

†John H. Boyles (1969), LL.B. <i>Visiting Lecturer of Law</i>	Georgetown University Washington, D. C.
Joseph J. Breen, B.S. <i>Chemistry</i>	2021 Acme Street
Linda M. Breytspraak, M.A. <i>Sociology</i>	University Apartments F-3B
John C. Browne, B.S. <i>Physics</i>	11 Georgetown Manor
Howard C. Bybee <i>Romance Languages</i>	93-B Colonial Apartment
Clarke E. Cochran, M.A. <i>Political Science</i>	1107 Glendale Avenue
Elizabeth E. Colford, M.A. <i>Romance Languages</i>	301 Swift Avenue Apartment 4
Robert L. Cook, Ph.D <i>Physics</i>	904 Murray Street
Norville David Crowder, M.A. <i>Sociology</i>	904 Lancaster Street
Gary Crowther, A.B. <i>Chemistry</i>	303 E. Trinity
Frank De Lucia, B.S. <i>Physics</i>	1618 North Duke
Mary A. Donovan, B.A. <i>Classical Studies</i>	Hanes House Annex
Sadik T. Duda, Ph.D. <i>Slavic Languages</i>	2604 Wedgedale Avenue
John M. Dunaway <i>Romance Languages</i>	103 East Club Boulevard
Marilyn T. Erickson, Ph.D <i>Visiting Part-time Associate Professor</i>	2601 Tanglewood Drive
Anne C. Fong, M.A. <i>Romance Languages</i>	903 Monmouth Avenue
Richard R. Forry, B.S. <i>History</i>	1719 N. Roxboro
Dorothy M. Frasure, A.B. <i>Romance Languages</i>	1406-A Duke University Road Apartment 32
Nancy J. Fratcher, B.A. <i>Chemistry</i>	301 Swift Avenue
Antonio Garnica-Silva, M.A. <i>Romance Languages</i>	Box 1122 MGC
Annie P. Geoghegan, Licence <i>Romance Languages</i>	704 N. Buchanan
Roy Gilchrist, M.P.H. <i>Physical Education</i>	1611 Duke University Road
William A. Greenlaw, B.D. <i>Religion</i>	906 North Buchanan Boulevard
Peggy J. Hackey, B.A. <i>Physical Education, Women</i>	Efland, N. C.
G. Felda Hardymon, B.S. <i>Mathematics</i>	521 Green Street
Richard L. Hawks, B.S. <i>Chemistry</i>	D-9 Westover Park Apartments
V. Dwight House, B.A. <i>Mathematics</i>	913 Buchanan Blvd.

†From 9-15-69 through 10-31-69.

Richard H. Hudson, M.A.	
<i>Mathematics</i>	938 Lambeth Circle
Elizabeth Humphrey, M.A.	14 Campus Apartments
<i>Romance Languages</i>	Elf Street
Ralph E. Johnson, M.A.	2218 Pratt Avenue
<i>Mathematics</i>	Apartment 10
Arnold H. Kadish, M.D.	
<i>Medicine</i>	California
Herbert J. Kirk, M.F.	101 Hudson Street
<i>Forestry</i>	Raleigh, N. C.
Robert Krajewski, M.S.	
<i>Education</i>	2518 Elgin Street
Thomas Kramer, M.A.	
<i>Mathematics</i>	705 West Markham Avenue
David C. Kurtz, M.A.	5 Amity Court
<i>Mathematics</i>	Chapel Hill, N. C.
Ruby Lanier, M.A.	
<i>Education</i>	1145 Graduate Center
Jean Pierre LeGoff, B.A.	Apt. H-9
<i>Romance Languages</i>	2312 Pratt Street
Susan E. Leibowitz, M.A.	301 Swift Avenue
<i>Romance Languages</i>	Apartment 25
Thomas A. Levy, M.A.	
<i>Political Science</i>	39-A Colonial Apartments
Nelson R. Lipshutz, Ph.D.	Apartment G-9
<i>Physics</i>	3600 Tremont Drive
Adeline McCall, M.A.	P.O. Box 843
<i>Music</i>	Chapel Hill, N. C.
Donald L. Maddox, B.A.	
<i>Romance Languages</i>	1400 Green Street
Greta C. Miao, M.A.	
<i>Sociology</i>	900 House Avenue
R. Scott Moreland, B.A.	
<i>Economics</i>	4321 Guess Road
Dale K. Myers, Ph.D.	
<i>Chemistry</i>	Boyce Mill Road
Joseph C. Nichols, B.A.	
<i>Mathematics</i>	Eubanks' Trailer Court
Jean F. O'Barr, Ph.D.	
<i>Political Science</i>	804 Berkeley Street
Rufus D. Owens, A.B.	
<i>Chemistry</i>	Route 1, Box 111
David Payne, M.A.	
<i>History</i>	220 Monmouth
Ralph F. Pervan, M.A.	
<i>Political Science</i>	613 Swift Avenue
Ruth Phelps, M.A.	
<i>Music</i>	2255 Cranford Road
Jeffrey L. Piech, M.A.	
<i>Mathematics</i>	824 Green Street
Ray V. Poore, Ph.D.	
<i>Physics</i>	426 Carolina Circle
John Puzak, B.S.	
<i>Chemistry</i>	1000 Duke Street
James C. Reber, M.A.	
<i>Mathematics</i>	1403 Duke University Road

Frances Redding, M.Ed. & M.M. <i>Music</i>	3407 Noel Court, Raleigh
George Ritchie, M.M. <i>Music</i>	1704 Hillcrest Drive Apartment L
Janet McMillan Rives, B.A. <i>Management Sciences</i>	20F Valley Terrace Apartments
Norfleet W. Rives, Jr., A.B. <i>Management Sciences</i>	20F Valley Terrace Apartments
R. Ames Schroeder, B.S. <i>Mathematics</i>	3407 Angus Road
Joyce Scott, M.A. <i>Romance Languages</i>	2223 Lafayette Street
Betty Jean Seymour, M.R.E. <i>Divinity (Remedial English)</i>	1803 House Avenue
Larry D. Shatoff, A.B. <i>Mathematics</i>	Imperial Apartments #1 301 W. Trinity Avenue Apartment 8
Frederick G. Sheppard, B.S. <i>Civil Engineering</i>	2007 House Avenue
Ida Harper Simpson, Ph.D. <i>Sociology and Anthropology</i>	604 Brookview Road Chapel Hill, N. C.
Joseph H. Somers, B.A. <i>Chemistry</i>	106 Woodridge Drive
Randall M. Stokes, M.A. <i>Sociology</i>	910 Clarendon Street Apartment H-19
Robert T. Stubbs, M.S. <i>Mathematics</i>	3600 Tremont Drive 53 Maxwell Road Chapel Hill, N. C.
Gene Waylon Talley, B.A. <i>Slavic Languages and Literatures</i>	
Barbara Thompson, M.F.A. <i>Art</i>	Route 1, Box 17, Randolph Road
Lori Reed Toepel, M.A. <i>Classical Studies</i>	301 Swift Avenue
Emma Trembl <i>Slavic Languages and Literatures</i>	603 Long Leaf Drive Chapel Hill, N. C.
Joan Troy, M.A.T. <i>Mathematics</i>	228 Pineview Road
Hendrik Van Dijk <i>Art</i>	6605 College Station
Robert M. Viti <i>Romance Languages</i>	201 Valley Terrace Apartments
Joyce Wasdell, M.A.T. <i>Lecturer in Education</i>	1603 Acadia
Katherine Way, Ph.D. <i>Physics</i>	3510 Mossdale Road
Oliver L. Weaver, B.S. <i>Physics</i>	506 North Buchanan Apartment 8
James K. Weber, M.A. <i>Mathematics</i>	2304 Elba Street
Donald H. Windham <i>Romance Languages</i>	102-A Colonial Apartments
George Wright, B.S. <i>Chemistry</i>	3312 F. Mordecai
James Young, M.M. <i>Music</i>	2510 Nation Avenue

Research Associates

Joan Abbott, Ph.D. <i>Physiology-Pharmacology</i>	910 Markham Avenue
Bruce W. Anderson, M.A. <i>Sociology</i>	1902 House Avenue
Kenneth L. Anderson, Ph.D. <i>Microbiology</i>	73 Willow Terrace Chapel Hill, N. C.
Carl Andrus, Ph.D. <i>Immunology</i>	51-D Colonial Apartments 3022 Chapel Hill Road
Ingemar Bjork, M.D. <i>Biochemistry</i>	2412 Vesson Avenue Apartment 11
Raymond Frederick Bratton, Ph.D. <i>Chemistry</i>	A-308 Bristol Court Apartments
Virginia S. Bryan, Ph.D. <i>Botany</i>	1108 Watts Street
Vina Buettner-Janusch, Ph.B. <i>Anatomy</i>	1528 Hermitage Court
John Gordon Burch, M.D. <i>Medicine</i>	1017 Anderson Street
Donald Calbreath, Ph.D. <i>Biochemistry</i>	116 W. Seeman Street
Francis Castellino, Ph.D. <i>Biochemistry</i>	12-A Colonial Apartments Apartment 26E
James Cederberg, Ph.D. <i>Physics</i>	866 Louise Circle
Phillip L. Coggon, Ph.D. <i>Chemistry</i>	2732 Middleton Avenue Apartment 1-H
Sheila J. Counce-Nicklas, Ph.D. <i>Zoology</i>	3101 Camelot Court
Chicita F. Culberson, Ph.D. <i>Botany</i>	Route 7, George King Road
Amiram Daniel, Ph.D. <i>Biochemistry</i>	804 Ellerbee Street
Jeffrey Dawson, Ph.D. <i>Biochemistry</i>	102D Colonial Apartments Chapel Hill Road
Takehiko Deguchi, Ph.D. <i>Physiology and Pharmacology</i>	Westover Park Apartments
Demosthenes Dialectic, Ph.D. <i>Physics</i>	1803 House Avenue Apartment 6-B
A. E. L. Dieperink, Ph.D. <i>Physics</i>	953 Lambeth Circle
Harold Edwards, Ph.D. <i>Anatomy</i>	2610 University Drive
Herbert Evans, Ph.D. <i>Biochemistry</i>	6C Chesterfield Apartments
Robert Ferris, Ph.D. <i>Biochemistry</i>	5-C Colonial Apartments
Wayne Fish, Ph.D. <i>Biochemistry</i>	2115 Sunset Avenue
Irving D. Fox, M.D. <i>Medicine</i>	3022 Chapel Hill Road
Michael Douglas Freezor, M.D. <i>Medicine</i>	D8 Colony Apartments Chapel Hill, N. C.

Ruth S. Georgiade, M.A. <i>Surgery</i>	2523 Wrightwood Avenue
Ben Z. Ginzburg, Ph.D. <i>Physiology-Pharmacology</i>	2101 West Club Boulevard
Lida Gottsch, M.D. <i>Surgery</i>	4008 Bristol Road
Christopher R. Gould, Ph.D. <i>Physics</i>	2408 Highland Avenue
Robert Green, Ph.D. <i>Biochemistry</i>	600-4 La Salle Street Apartment 10H
Emily Grothaus, Ph.D. <i>Immunology</i>	6B Triangle Apartments Route 1
Kazimierz Grzybowski, S.J.D. <i>Rule of Law Research Center</i>	2605 University Drive
Reed Hainsworth, Ph.D. <i>Zoology</i>	3600 Tremont Drive Apartment G-8
John W. Halderman, LL.B. <i>Rule of Law Research Center</i>	2216 Elmwood Avenue
Carole L. Hall, Ph.D. <i>Biochemistry</i>	3816 Hillgrand Drive
G. Wesley Hatfield, Ph.D. <i>Microbiology and Biochemistry</i>	2608 Francis Street
Alan J. Hay, Ph.D. <i>Microbiology</i>	26 C Colonial Apartments Route 1, Box 399 Murphy School Road
Thomas D. Hayward, Ph.D. <i>Physics</i>	3652 Pineview Circle
Paul A. Helminger, B.S. <i>Physics</i>	846 Louise Circle
Dan Heth, Ph.D. <i>Botany</i>	4300 W. Galax Drive Raleigh, N. C.
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Ryan Huxtable, Ph.D. <i>Biochemistry</i>	Atlas Apartments #8 200 Atlas Street Apartment 3H
Ryotaro Ishizaki, D.V.M. & Ph.D. <i>Surgery</i>	2716 Middleton Avenue
Yoshiaki Ito, M.D. <i>Microbiology</i>	D128 Bristol Court Apartments
Robert A. Izydore, Ph.D. <i>Chemistry</i>	Route 7, Box 270
Frances C. Jeffers, M.A. <i>Psychiatry</i>	2118 Summit Street
Claudius Jones, R.M.T. <i>Obstetrics and Gynecology</i>	Westover Park Apartments D-6
Vasudev C. Joshi, Ph.D. <i>Biochemistry</i>	1506 Southwood Drive
Varda Kahn, Ph.D. <i>Physiology-Pharmacology</i>	1320 Clarendon Street Apartment 8, Carstelle
Mogers Kampp, M.D. <i>Physiology-Pharmacology</i>	1200 House Avenue
Masayuki Kanda, Ph.D. <i>Biochemistry</i>	2732 Middleton Avenue
Louise A. Kaufman, B.A. <i>Obstetrics and Gynecology</i>	200 Seven Oaks Road Apartment 12-B
Bernard Keele, Ph.D. <i>Biochemistry</i>	

Lieselotte Kemper	
<i>Pathology</i>	113 Newell Street
Gary Kirk, Ph.D.	
<i>Physiology-Pharmacology</i>	4155 Deepwood Circle
Annette Kirshner, Ph.D.	
<i>Biochemistry</i>	2524 Wrightwood Avenue
Gordon K. Klintworth, M.D.	
<i>Ophthalmology</i>	614 Starmont Drive
Stuart Knutton, Ph.D.	
<i>Anatomy</i>	
Hordur Kristinsson, Ph.D.	
<i>Botany</i>	28-B Colonial Apartments
Alfonso Langlois, Ph.D.	
<i>Surgery</i>	1720 Vista Street
Michael A. McAnulty, M.D.	Windsor Circle
<i>Medicine</i>	Chapel Hill, N. C.
Kenneth Mann, Ph.D.	
<i>Biochemistry</i>	1303 Washington Street
Patrick Mattock, Ph.D.	
<i>Biochemistry</i>	1507 W. Pettigrew Street
Michael Meier, B.S.	1000 N. Duke Street
<i>Physics</i>	Apartment 11
Eileen Mikat, M.A.	109 Old Oxford Road
<i>Pathology</i>	Chapel Hill, N. C.
Winston Moo-Penn, Ph.D.	A305 Bristol Court
<i>Biochemistry</i>	1106 Douglas Street
David Murrish, Ph.D.	1106 Douglas Street
<i>Zoology</i>	A-103 Bristol Court Apartments
Dale K. Myers, Ph.D.	
<i>Chemistry</i>	Boyce Mill Road
Kenneth J. Payne, Ph.D.	C320 Bristol Court Apartments
<i>Microbiology</i>	1106 Douglas Street
Calillo Peracchia, M.D.	
<i>Anatomy</i>	38 DuPont Circle
Fred O. Purser, Ph.D.	
<i>Physics</i>	2309 Barrymore Avenue
Manuel Sanchez-Diaz, Ph.D.	
<i>Botany</i>	811 Onslow Street
Eleanor R. Scheer, Ph.D.	
<i>Microbiology</i>	2009 Erwin Road
Horst Schulz, Ph.D.	918 Monmouth Avenue
<i>Biochemistry</i>	Apartment 4
Ilan Shif, Ph.D.	Apartment A-2
<i>Microbiology</i>	2724 Middleton Avenue
Ida H. Simpson, Ph.D.	604 Brookview
<i>Sociology</i>	Chapel Hill, N. C.
Ralph Smith, Ph.D.	
<i>Microbiology</i>	922 Green Street
Thomas Stambach, Ph.D.	
<i>Physics</i>	2410 Huron Circle
Robert D. Stevens, Ph.D.	
<i>Chemistry</i>	711 Watts Street
J. Bolling Sullivan, Ph.D.	
<i>Biochemistry</i>	3214 Duke Homestead Road
Lidya Sverak, Ph.D.	Executive Apartments
<i>Surgery</i>	900 W. Trinity Avenue

Archie Swindell, Ph.D. <i>Biochemistry</i>	B-9 Morreene Manor Apartments
Charles R. Taylor, Ph.D. <i>Zoology</i>	2911 Arnold Street Box 1324 Chapel Hill, N. C.
Alberta Thiele, B.A. <i>Surgery</i>	76-A Colonial Apartments
Magda Tieffenberg, "Licenciada" in Physics <i>Physiology-Pharmacology</i>	1 Dupont Circle Apartments
Ian Trayer, Ph.D. <i>Biochemistry</i>	C2 Westover Apartments Apartment 28F 705 Louise Circle
Leos G. Veprek, Ph.D. <i>Surgery</i>	942 Lambeth Circle
Ching Wang, Ph.D. <i>Physiology-Pharmacology</i>	806 Onslow Street
Norimitsu Watabe, Ph.D. <i>Zoology</i>	4713 Angus Road 48 Hayes Road Chapel Hill, N. C.
Michael Whalen, M.D. <i>Immunology</i>	1106 Douglas Street
Frances L. Wilkie, M.A. <i>Psychiatry</i>	A 109 Bristol Court Apartments
Lawrence Wilson, Ph.D. <i>Immunology</i>	510 Du Pont Circle #27
Kin-Ping Wong, Ph.D. <i>Biochemistry</i>	26 Georgetown Manor 1000 N. Duke Street
Louis E. Wright, Ph.D. <i>Physics</i>	
Hans Zweerink, Ph.D. <i>Microbiology</i>	

Clinical Faculty—Medical School

Sherwood W. Barefoot, M.D. <i>Clinical Associate in Dermatology</i>	1030 Professional Village Greensboro, N. C.
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Director of Sports Information	
Albert George Buehler (1955), M.A.	4713 Stafford Drive
Coach of Cross Country; Track Coach	1504 Lamont Court
Thomas Arden Butters, B.A.	Chapel Hill, N. C.
Head Baseball Coach	
Herschel Amos Caldwell	3100 Devon Road
Assistant Coach of Football	
Thomas Stanley Coble, III, A.B.	703 Louise Circle
Assistant Baseball Coach	
Bruce Alan Corrie (1965), M.S.	3223 Haddon
Intramural Supervisor and Coach of Lacrosse	
Robert Calvin Cox (1942), M.A.	1913 University Drive
Assistant Coach of Football and Coach of Tennis	
John Stanley Crisson, A.B.	3315 Waterbury Drive
Assistant Coach of Football	
Howard Max Crowder, A.B.	202 Card Gymnasium
Co-Athletic Trainer	
Otho Leroy Davis (1965), M.A.	214 Lansbury Drive
Co-Trainer	
Carmen M. Falcone (1946), M.A.	1402 Woodburn Road
Assistant in Football	
John A. Friedrich (1963), Ph.D.	2953 Welcome Drive
Chairman of Health and Physical Education	Route 1
Department and Assistant Director	Cornwallis Road
of Physical Education and Intramural Programs	
Ellis P. Hagler (1936)	3607 Mossdale Street
Coach of Varsity Golf and Manager Golf Club House	
Thomas Moore Harp, A.B.	N-3-A University Apartments
Head Football Coach	Route 2, Russell Road
William John Harvey (1960), B.S.	3215 Cromwell Road
Wrestling Coach	
Jacque Ray Hetrick, B.S.	Box 10, Waterbury Drive
Assistant Football Coach	
George E. Hill, M.S.	
Assistant Football Coach	
Harold T. Hunter, M.S.	
Assistant Football Coach	

Hubert Murry Lewis, B.S. <i>Business Manager of Athletics</i>	63 Beverly Drive
Robert Agner Lutz, B.A. <i>Assistant Varsity Golf Coach</i> <i>Assistant Manager of Golf Club House</i>	4319 Malvern Road
Harold N. McElhaney, B.A. <i>General Administrative Assistant</i>	3403 Rolling Hill Road
Walter Scott Persons, A.B. <i>Coach of Swimming</i>	612 Swift Avenue
Jack V. Schalow, B.S. <i>Assistant Basketball Coach</i>	312 Melbourne Road
Leroy Cornelius Skinner, M.A. <i>Co-Coach of Lacrosse, Soccer</i>	2018 Sunset Avenue
Sam Thomas Timer, M.S. <i>Assistant Football Coach</i>	3535 Hamstead Court
Raymond C. Waters, M.A. <i>Head Coach of Basketball</i>	2715 Tyron Road

Audiovisual Education (Medical Center)

Samuel A. Agnello, A.B. <i>Director</i>	1208 Woodburn Road
Wayne C. Williams, A.B. <i>Assistant Director, and</i> <i>Coordinator, Medical Photography</i>	12 Winthrop Court
Elon H. Clark <i>Coordinator, Medical Art</i>	801 W. Maynard Avenue
Michael E. Wayda, M.A. <i>Coordinator, Medical Television</i>	9 Ashley Road
Robert L. Blake <i>Associate Coordinator, Medical Art</i>	609 Ruby Street
Raymond Howard <i>Associate Coordinator, Medical Photography</i>	612 Colgate Street
F. Eugene Bradley <i>Chief Engineer, Central TV Facility</i>	4102 Guess Road
Floyd Willard, A.B. <i>Audiovisual Communications</i> <i>Affiliate (V. A. Hospital)</i>	F-3-1 Westover Park Apartments
Donald Powell, A.B. <i>Adjunct Artist (V. A. Hospital)</i>	Erwin Road

Duke University Press

Ashbel Green Brice <i>Director and Editor</i>	813 Vickers Avenue
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Kenneth Holland Cherry <i>Assistant Editor</i>	Randolph Road, Route 1, Box 20
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Food Services

Mae Bennett	
<i>Manager, the Dining Hall, Gilbert Addoms</i>	818 Onslow Street
Dennis R. Bullock, B.A.	Route 1, Box 110E
<i>Office Manager, the Dining Halls, Men's College</i>	Bahama, N. C.
Mae Eaton	
<i>Manager of Service and Selling</i>	
<i>The Dining Halls, Men's College</i>	918 Plum Street
Sayed M. El Naga	
<i>Food Production Manager, the</i>	
<i>Dining Halls, Men's College</i>	3747 Jamestown Circle
Virginia Etheridge	
<i>Supervisor, the Dining Halls, Men's College</i>	2313 West Pettigrew Street
Joel W. Hobgood	
<i>Supervisor, The Cambridge Inn</i>	1508 Morning Glory Avenue
Marvin G. Johnson	
<i>Assistant Manager, the Dining</i>	
<i>Halls, Woman's College</i>	1304 North Duke Street
William D. Jones	
<i>Special Functions Manager</i>	1302 Rosewood Avenue
Samuel Jordan	
<i>Head Chef, Graduate Center</i>	818 Ridgeway Avenue
Maxine King	
<i>Supervisor, the Dining Halls, Men's College</i>	407 Cecil Street
Winnie Maske	
<i>Supervisor, The Coffee Lounge, Graduate Center</i>	3002 Mossdale Avenue
Maggie McGhee	
<i>Supervisor, the Dining Halls, Men's College</i>	1112 Carroll Street
Edward McNeill	
<i>Supervisor, Housekeeping the</i>	
<i>Dining Halls, Men's College</i>	2707 Fayetteville Street
Dave Neal	
<i>Night Manager, the Dining Halls, Men's College</i>	Route 8, Box 79
William C. Philpot	
<i>Head Chef, Men's College</i>	810 Center Street
Betty Simms	
<i>Assistant Manager, the Dining Hall,</i>	
<i>Gilbert Addoms</i>	903 Willowdale Street
Alfred Stephens	
<i>Personnel Manager, the Dining Halls, Men's College</i>	1408 Ruffin Street
Leon Thompson	
<i>Head Chef, the Woman's College</i>	2624 Lincoln Street
Lillie Upchurch	
<i>Supervisor, the Dining Hall, Gilbert Addoms</i>	427 Eric Street
Myrtle Washington	
<i>Supervisor, the Dining Halls, Men's College</i>	113 Moline Street
Doris Williams	
<i>Supervisor, The Oak Room, Men's College</i>	1415 Ridgeway Avenue

House Counselors, The Woman's College

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<i>Counselor</i>	Southgate Hall

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Flo Denny, A.B. <i>Counselor</i>	Bassett House
Elizabeth Dix, M.A. <i>Counselor</i>	Jarvis House
Judith Greene, M.A.T. <i>Counselor</i>	Pegram House
Sandra Holloway, M.A. <i>Counselor</i>	Alspaugh House
Nanine Murray, M.A.T. <i>Counselor</i>	Epworth Inn
Sharon Peterson, A.B. <i>Counselor</i>	Graduate Center
Joselyn Regen, A.B. <i>Counselor</i>	Gilbert House
Jeanne Robinson, A.B. <i>Counselor</i>	Faculty Apartments
Bernadette Scott, A.B. <i>Counselor</i>	Aycock House
Kay Eugenia Weston, M.A. <i>Counselor</i>	Brown House
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Music

Allan Hadley Bone, M.M. <i>Conductor of the Symphony Orchestras</i>	2725 Sevier Street
Paul Robey Bryan, Ph.D. <i>Conductor of the Bauds</i>	1108 Watts Street
Dorothy Dozier, A.B. <i>Record Librarian</i>	1112 N. Gregson
John Kennedy Hanks, M.A. <i>Director of Voice Eusemble</i>	1810 Glendale Avenue
James Henry, M.M. <i>Director of Marching Baul</i>	311 West Delafield Avenue
George Ritchie, M.M. <i>Chapel Organist and Assistant Director</i>	1704 Hillcrest Dr. Apartment L
Eugenia Curtis Saville, M.A. <i>Director of the Madrigal Singers</i>	1103 Anderson Street
James Benjamin Smith, M.S.M. <i>Director of Chapel Music</i> <i>and Choral Music</i>	1929 Front Street Apartment G
Loren Ralph Withers, M.S. <i>Director of Piano Ensemble</i>	2741 Dogwood Road
James Young, M.M. <i>Assistant Director of Choral Music</i>	2510 Nation Avenue

The University Stores

Jesse Davis Wellons, Jr. <i>Director of Stores Operations</i>	2602 Augusta Drive
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Assistant Director-Operations and Personnel	2531 Wilson Street
Harry G. Rainey, B.S.	P.O. Box 147, Route 2
Assistant Director-Marketing	Riverdale Drive
John R. Hyre, B.S.	513 Redbud Road
Stores Controller	Chapel Hill, N. C.
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Manager, University Men's Store	4604 Erwin Road
Richard Allan Blalock	
Manager, Woman's College Store	3605 Westminster Avenue
Harry E. Gentry	
Manager, Medical Center Store	4 Jefferson Drive
Allan J. Petch (Jeremy North)	
Bookman, Gothic Bookshop	Route 1, Box 204-A
Earl W. Wilson, A.B.	
Manager, University Bookstore	2734 Sevier Street
William L. Batts	
Manager, University Vending Service	2833 Duke Homestead Road
Loy A. Nash, A.B.	
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The University Libraries

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Associate Librarian, Readers' Services	2812 Devon Road
Gertrude Merritt, A.B.	
Assistant Librarian, Technical Services	1028 Monmouth Avenue

Perkins Library

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Assistant, George Washington Flowers Collection	2409 Club Boulevard
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Reference Librarian	Apt. 1-D, 2720 Erwin Road
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Assistant, Serials	500 Dupont Drive, Apt. 30
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Assistant, Serials	306 Clark Street
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Head, Reference Department	709 West Club Boulevard
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Director, George Washington Flowers Collection	Chapel Hill
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Assistant, Acquisitions	3022 Chapel Hill Road
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Woman's College Library

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Clare J. Tufts <i>Assistant, Circulation</i>	D-3A University Apartments

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Librarian 512 Watts Street

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Rebecca C. Clayton, B.A.
Assistant 405 Gary Street
Sandra R. Cofield, B.S.
Assistant 810 Demerius Street, Apartment S-2

Chemistry Library

Sally H. Smith, B.A.
Librarian 1500 Duke University Road

Divinity School Library

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Mary B. Finnin
Assistant, Circulation 813 Buchanan Boulevard, Apartment 1
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Reference Librarian F-1B University Apartments
Carolyn C. London
Assistant 3204 Sherbon Drive

School of Engineering Library

Joe C. Rees, M.S.L.S.
Librarian 100½ Gloria Avenue

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Eunice Churchill, B.A., M.L.S.
Circulation Librarian 29 South Circle Drive
Madeline Copeland, A.B.L.S.
Cataloger Chapel Hill, N. C.
1018 Monmouth Avenue
Katharine Day, B.S.L.S.
Assistant Librarian 1021 Minerva Avenue
Twila Herr, B.A.
Circulation Assistant D-229 Bristol Courts
1106 Douglas Street
Alice Hollis, Ph.B.
Serials Cataloger 104 Glendale Drive
Chapel Hill, N. C.
Mary Ann Kennedy, B.A.
Library Assistant 2723 Brown Avenue
Apartment C
Annie C. Walker
Assistant, Order Department 2527 Wilson Street

Carolyn W. Watanabe, B.A.
Assistant in Circulation Department
Betty Shen Wu, M.A. in L.S.
Cataloger

869 Louise Circle

2724 Erwin Road

Medical Center Library

G. S. Terence Cavanagh, B.L.S.
Director, and Curator of Trent Collection

1200 Leon Street

Warren P. Bird, M.S.
Associate Director

2007 House Avenue

Constance M. Tatum, M.S.
Chief Cataloger

1607 Fayetteville Street

Mary Ann Brown, M.A.
Chief Reference Librarian

2521 Shenandoah Avenue

Eula Wheeler, M.S.
Acquisitions Librarian

28 Mt. Bolus Road
Chapel Hill, N. C.

Kathryn Kruse, M.A.
Reference Librarian

1600 Anderson Street

Susan C. Smith, B.S., M.F.A.
Assistant Curator, Trent Collection

3204 Hope Valley Road

Pietro Tavernise
Circulation Librarian

208 Watts Street

Jane Weaver, M.S.
Extension Reference Librarian

2229 Lafayette Street

Judy Woodburn, M.S.
Serials Librarian

2108 Summit Street

Nursing School Library

Mary Horres, M.S.
School of Nursing Librarian

41 Manor Court

Physics-Mathematics Library

Mary Cox, B.A.
Librarian

1913 University Drive

1970

JULY

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SEPTEMBER

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1970-1971

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Durham, North Carolina 1970

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Calendar of the Law School

1970

September

- 9 Wednesday—Registration for first year students 9:00 a.m. to 12:00 p.m.—Registration for second and third year students and Orientation for first year students 1:00 p.m. to 5:00 p.m.
- 10 Thursday, 8:00 a.m.—Classes begin

November

- 25 Wednesday, 6:00 p.m.—Thanksgiving holidays begin
- 30 Monday, 8:00 a.m.—Classes resume

December

- 14-15 Monday-Tuesday—Registration for spring semester
- 19 Saturday, 1:00 p.m.—Classes for first semester end and Christmas recess begins

1971

January

- 4 Monday—Reading period begins
- 8 Friday—Mid-year examinations begin for second and third year students; Final examination in Criminal Law for first year students.
- 9 Saturday—Mid-year examination in Property for first year students.
- 11 Monday—Classes resume for first year students in Civil Procedure, Constitutional Law, Contracts, Property, and Torts
- 19 Tuesday—Mid-year examinations end for second and third year students; classes end for first year students
- 20 Wednesday—Intercessional
- 25 Monday—Spring semester classes begin for all students

March

- 27 Saturday, 1:00 p.m.—Spring vacation begins

April

- 6 Tuesday, 8:00 a.m.—Classes resume

May

- 13 Thursday, 6:00 p.m.—Spring semester classes end
- 14 Friday—Reading period begins
- 17 Monday—Final examinations begin
- 29 Saturday—Final examinations end

June

- 5 Saturday—Commencement begins
- 7 Monday—Graduation exercises

Officers of the University Administration

Terry Sanford, LL.B., *President*

Barnes Woodhall, M.D., *Chancellor pro tem*

Marcus E. Hobbs, Ph.D., *Provost*

Charles B. Huestis, *Vice President for Business and Finance*

William G. Anlyan, M.D., *Vice President for Health Affairs*

Frank Leon Ashmore, A.B., *Vice President for Institutional Advancement*

Gerhard Chester Henriksen, M.A., C.P.A., *Vice President and Treasurer*

Everett Harold Hopkins, M.A., LL.D. *Vice President for Regional Programs*

Harold W. Lewis, Ph.D., *Vice Provost and Dean of Faculty*

John C. McKinney, Ph.D., *Vice Provost and Dean of the Graduate School*

James L. Price, Jr., Ph.D., *Vice Provost and Dean of Undergraduate Education*

Craufurd David Goodwin, Ph.D., *Vice Provost and Director of International Programs*

Benjamin Edward Powell, Ph.D., *Librarian*

Clark R. Cahow, Ph.D., *University Registrar*

Rufus H. Powell, LL.B., *Secretary of University*

Stephen Cannada Harward, A.B., C.P.A., *Assistant Secretary and Controller*

Edwin Constant Bryson, LL.B., *University Counsel*

Law Faculty

Hans W. Baade, A.B., LL.B., LL.M., Dr.iur., Diplome de Droit International, *Professor of Law*

A.B. 1949, Syracuse University; Dr.iur. 1951, University of Kiel, Germany; LL.B., LL.M. 1955, Duke University; Diplome 1956, Hague Academy of International Law. Assistant, 1955, and Referent, 1956-1960, Institute of International Law, University of Kiel, Germany. Associate Professor of Law, Duke University, 1960-63; Visiting Professor of Law, University of Toronto, 1970-1971. Professor of Law, since 1964.



Edwin C. Bryson, LL.B., *Professor of Law*

University of North Carolina, 1922-1925; Duke University, 1932-1933; LL.B. 1937, University of Oregon. General practice, 1927-1930. Assistant in Duke University Legal Aid Clinic, 1931-1947; Duke University Counsel since 1945. Associate Professor of Law 1947-1954; Professor of Law, since 1954.



William D. Caffrey, B.S., M.A., LL.B., *Adjunct Professor of Law*

B.S. 1950, Indiana State Teacher's College; M.A. 1954, George Washington University; LL.B. 1958, Duke University. General practice 1958 to date. Adjunct Professor of Law, Duke University 1968 and 1970.





George C. Christie, A.B., J.D., S.J.D., Diploma in International Law, *Professor of Law*

A.B. 1955, J.D. 1957, Columbia University; S.J.D. 1966, Harvard University, Diploma in International Law, 1962, Cambridge University. General practice, 1958-1960; Ford Fellow, Harvard Law School, 1960-1961; Fulbright Scholar, Cambridge University, 1961-1962; Associate Professor of Law, University of Minnesota, 1962-1965; Professor of Law, University of Minnesota, 1965-1966; Assistant General Counsel for the Near East and South Asia, Agency for International Development, 1966-1967. Professor of Law, Duke University, since 1967.



Walter E. Dellinger III, A.B., LL.B., *Associate Professor of Law*

A.B. 1963, University of North Carolina; LL.B. 1966, Yale University. Associate Professor of Law, University of Mississippi, 1966-68; Law Clerk to Associate Justice Hugo L. Black, U.S. Supreme Court, 1968-1969. Associate Professor of Law, Duke University, since 1969.

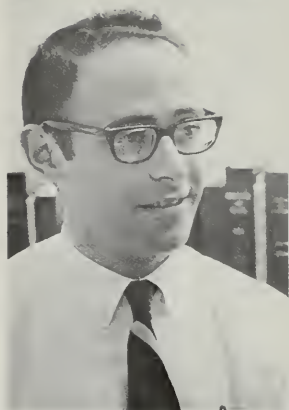


Robinson Oscar Everett, A.B., LL.B., *Professor of Law; Associate Editor, Law and Contemporary Problems*

A.B. 1947, LL.B. 1950, Harvard University. Assistant Professor of Law, Duke University, 1950-1951; Military Service, Legal Officer in Air Force, 1951-1953; Commissioner of the U.S. Court of Military Appeals, 1953-1955; general practice, since 1955. U.S. Senate Subcommittee on Constitutional Rights of the Committee on the Judiciary, Counsel, 1961-1964, Consultant since 1966; Commissioner on Uniform Laws, since 1962; Consultant to Office of Economic Opportunity, since 1965; member of American Law Institute, since 1966. Visiting Associate Professor of Law, Duke University, 1956-1961; Adjunct Professor of Law, 1961-1966; Professor of Law, since 1967.

Ernest Gellhorn, B.A., LL.B., *Professor of Law*

B.A. 1956, LL.B. 1962, University of Minnesota. U. S. Navy, 1956-1959; general practice, 1962-1966. Associate Professor of Law, Duke University, 1966-1969; Professor of Law, since 1969.



Kazimierz Grzybowski, M.L.L., D.L.L., S.J.D., *Professor of Law and Adjunct Professor of Political Science*

M.L.L. 1931; Doctor of Law and Political Science, 1934, University of Lwow; S.J.D. Harvard, 1933; Associate Professor, School of Law and Graduate School of Diplomacy, University of Lwow, 1936-1939; Judge of District Court of Lwow; Military Service, 1939-1948; Editor, Law Library, Library of Congress, Washington, D. C., 1951-1960; Consultant, Social Science Division Rand Corporation, Santa Monica, California, 1960-1962; Visiting Professor, Michigan Law School, 1961-1962; Yale Law School, 1962-1963; Leiden University, Leiden, the Netherlands, 1963-1964; Senior Research Associate, Rule of Law Research Center, Duke University Law School since 1964; Visiting Professor, Strasbourg University, Strasbourg, France, 1967.



Clark C. Havighurst, A.B., J.D., *Professor of Law*

A.B. 1955, Princeton University; J.D. 1958, Northwestern University. Military Service, 1958-1960; Research Associate, Small Business Studies, Duke University, 1960-1961; general practice, 1961-1964; Visiting Associate Professor of Law, Stanford University, spring, 1968; Visiting Professor of Law, Northwestern University, spring, 1970; Editor, *Law and Contemporary Problems*, 1965-1970; Director, Committee on Legal Issues in Health Care, since 1969. Associate Professor of Law, Duke University, 1964-1968, Professor of Law, since 1968.





Richard D. Hobbet, B.A., J.D., *Professor of Law*

B.A. 1949, J.D. 1951, University of Iowa, Trial Attorney, U.S. Internal Revenue Service, 1951-1954; general practice, 1954-1967; Department Editor, *Journal of Taxation*, since 1963. Professor of Law, Duke University, since 1968.



Arthur Larson, A.B., M.A., B.C.L., J.D., D.C.L., LL.D., L.H.D., *Professor of Law and Director of Rule of Law Research Center*

A.B. 1931, LL.D. 1953, Augustana College; M.A. (Juris.) 1938; B.C.L. 1957, D.C.L. 1957, Oxford University; Fellow of Pembroke College, Oxford. General practice, 1935-1939; Assistant Professor of Law, University of Tennessee, 1939-1941; Division Counsel, Office of Price Administration, 1941-1944; Chief, Scandinavian Branch Foreign Economic Administration, 1944-1945; Associate Professor, Cornell Law School, 1945-1948; Professor of Law, Cornell Law School, 1948-1953; Fulbright Fellowship, London School of Economics, 1952; Dean, University of Pittsburgh Law School, 1953-1954; Knapp Professor of Law, University of Wisconsin School of Law, 1968; Under-secretary of Labor, 1954-1956; Director, U.S. Information Agency, 1956-1957; Special Assistant to the President 1957-1958; Special Consultant to the President 1958-1961; Consultant to the President on Foreign Affairs, 1964-68; Consultant to the State Department on International Organizations, 1963-1969. Professor of Law and Director of Rule of Law Research Center, Duke University, since 1958.



Elvin R. Latty, B.S., J.D., J.Sc.D., *William R. Perkins Professor of Law and Dean Emeritus*

B.S. 1923, Bowdoin College; J.D. 1930, University of Michigan; J.Sc.D. 1936, Columbia University. Instructor in Romance Languages, University of Vermont, 1923-1927; general practice, 1930-1933; Special Fellow, Columbia University, 1933-1934; Associate Professor of Law, University of Kansas, 1934-1935; Professor of Law, University of Missouri, 1935-1937; Visiting Professor of Law, George Washington University, summer, 1937, Stanford University, Summer 1938; University of North Carolina, summer, 1942, 1947, 1949, 1956; University of Texas, summer, 1951; University of Puerto Rico, spring, 1968; Fulbright lecturer, University of Pavia, Italy, 1954; Special Assistant to the American Ambassador, Caracas, 1942-1943; Acting Assistant Chief, Foreign Funds Control Division, U.S. Department of State, 1943. Professor of Law, Duke University, 1937-1966 and Dean of School of Law, 1958-1966; William R. Perkins Professor of Law and Dean Emeritus, since 1966.

Charles H. Livengood, Jr., A.B., LL.B., *Professor of Law*

A.B. 1931, Duke University; LL.B. 1934, Harvard University. General practice, 1934-1940, 1945-1948; Regional Attorney for the Seventh Region, Wage and Hour Division, U.S. Department of Labor, 1940-1941; Chief of the Wage-Hour Section, Office of the Solicitor of Labor, 1941-1942; Visiting Professor of Law, University of North Carolina, summer, 1948, 1967-1968; George Washington University, summer, 1949, 1956; Fulbright Lecturer, University Sydney, Australia, 1958-1959. Member, American Law Institute, since 1947; Consultant, U.S. Senate Subcommittee on Labor-Management Relations, 1950; Associate Editor, *Journal of Legal Education*, 1951-1952; Public Member, Wage Stabilization Board, Region III, 1952-1953; Member, National Academy of Arbitrators, since 1953; Vice-Chairman, N. C. General Statutes Commission, since 1967; Secretary, Section on Labor Relations Law, American Bar Association, 1967-1968, and Chairman, since 1958. Lecturer in Law, Duke University, 1946-1948; Associate Professor of Law, 1948-1951; Professor of Law, since 1951.



Forest Hodge O'Neal, A.B., J.D., J.S.D., S.J.D., *Professor of Law and Editor, Corporate Practice Commentator*

A.B. 1938, J.D. 1940, Louisiana State University; J.S.D. 1949, Yale University; S.J.D. 1954, Harvard University. Associate Professor of Law, University of Mississippi 1945-1946; Professor of Law, University of Mississippi, 1946-1947; Acting Dean and Professor of Law, Walter F. George School of Law, Mercer University, 1947-1948; Dean, Walter F. George School of Law, Mercer University, 1947-1956; Professor of Law, Vanderbilt University, 1956-1959; Visiting Professor of Law, New York University, 1957-1958; Editor, *Corporate Practice Commentator*, since 1959; University of Michigan, summer, 1965; University of Minnesota, fall, 1965. Professor of Law, Duke University, since 1959; Dean of School of Law 1966-1968.



Joel Francis Paschal, A.B., LL.B., A.M., Ph.D., *Professor of Law*

A.B. 1935, LL.B. 1938, Wake Forest College; A.M. 1942, Ph.D. 1948, Princeton University. Instructor in Law, Wake Forest College, 1939-1940; USNR, 1942-1946; Instructor, Princeton University, 1946-1947; Research Director, North Carolina Commission for the Improvement of the Administration of Justice, 1947-1949; general practice, 1949-1954; Visiting Professor of Law, Duke University, 1952-1953; Visiting Professor of Law, University of North Carolina, spring semester, 1956, fall semester, 1966. Associate Professor of Law, Duke University, 1954-1959; Professor of Law, since 1959.





A. Kenneth Pye, B.A., J.D., LL.M., *Professor of Law and Dean*

B.A. 1951, University of Buffalo, J.D. 1953, LL.M. 1955, Georgetown University. Military service 1953-1955; Professor of Law, 1955-1956, Associate Dean, 1961-1966, Georgetown University; Visiting Professor of Law, Johann Wolfgang Goethe University, Germany, summer, 1959; Duke University, spring, 1965; University of North Carolina, spring 1968. Banaras Hindu University, India, 1966-1967; Trustee, Legal Aid Agency for District of Columbia, 1963-1966; Chairman, Board of Directors, District of Columbia Neighborhood Legal Services Project 1963-1966; Program Specialist in Legal Education, The Ford Foundation (India), 1966-1967; Associate Director, A.A.L.S. Orientation Program in American Law, summer, 1965, Director 1967-1968; Project Co-Director of the ABA Commission on Campus Government and Student Dissent, 1969-1970. Member, American Law Institute. Professor of Law, Duke University, since 1966; Dean, 1968-1970.



Edward H. Rabin, A.B., LL.B., *Visiting Professor of Law*

A.B. 1956, Columbia University, LL.B. 1959, Columbia University. Law Clerk to Judge Frederick V.P. Bryan, U.S. District Court for the Southern District of New York, 1959-1961; general practice 1961-1963. Assistant Professor of Law, Rutgers University at Camden, 1962-1966; Acting Professor of Law, University of California at Davis, 1966-1967, Professor of Law, since 1967. Visiting Professor of Law, Duke University, 1970-1971.



Frank T. Read, B.S., J.D., *Assistant Professor of Law and Assistant Dean*

B.S. 1960, Brigham Young University; J.D. 1963, Duke University. General practice, 1963-1968. Assistant Dean and Assistant Professor of Law, Duke University, since 1968.

Neal P. Rutledge, B.A., LL.B., *Professor of Law*

B.A. 1947, Harvard College, LL.B. 1950, Yale University. Law Clerk to Judge Charles Fahy, United States Court of Appeals for the District of Columbia Circuit, 1950-1951; Law Clerk to Justice Hugo L. Black, U.S. Supreme Court, 1951-1952. Attorney, U.S. Atomic Energy Commission, 1952-1953; Director, Economic Opportunity Legal Services Program, Inc., of Dade County, Florida, 1966; general practice 1953-1970; Lecturer in Law, University of Miami, 1954. Professor of Law, Duke University, since 1970.



Melvin G. Shimm, A.B., LL.B., *Professor of Law; Faculty Adviser, Duke Law Journal and Legal Research Program*

A.B. 1947, Columbia University; LL.B. 1950, Yale University. 2nd Lt. FA(AUS), 1943-1946; general practice, 1950-1951; Counsel, Wage Stabilization Board 1951-1952; Bigelow Fellow, University of Chicago Law School, 1951-1953; Editor, *Law and Contemporary Problems*, 1955-1961; Editor, *Journal of Legal Education*, 1955-1963; American Editor, *Journal of Business Law*, 1955-1961; Visiting Associate Professor of Law, New York University, summer, 1957; Visiting Professor of Law, University of Southern California, summer, 1965; Visiting Professor of Law, University of North Carolina, spring, 1970; faculty, A.A.L.S. Orientation Program in American Law, summer, 1966, Director, since 1968; Senior Legal Consultant, The Brookings Institution, 1965-1968. Assistant Professor of Law, Duke University, 1953-1956; Associate Professor of Law, 1956-1959; Professor of Law, since 1959.



Bertel M. Sparks, B.S., LL.B., LL.M., S.J.D., *Professor of Law*

B.S. 1938, Eastern Kentucky State College; LL.B. 1948, University of Kentucky; LL.M. 1949, S.J.D. 1955, University of Michigan. Special Agent, U.S. Army Counter Intelligence Corps, 1941-1945; Instructor of Law, New York University, 1949-1950, Assistant Professor of Law, 1950-1952, Associate Professor of Law, 1952-1954, Professor of Law, since 1954; Visiting Professor of Law, University of Michigan, summer, 1956; Visiting Professor of Law, University of Kentucky, summer, 1957. Visiting Professor of Law, Duke University, 1966-1967; Professor of Law, since 1967.





William W. Van Alstyne, B.A., J.D., *Professor of Law*

BA. 1955, University of Southern California; J.D. 1958, Stanford University; Certificate, Hague Academy of International Law, 1961. California Department of Justice, 1958; United States Department of Justice, 1958-1959; Assistant Professor, Ohio State University College of Law, 1959-1961; Associate Professor, 1961-1964; Professor, 1964-1965; Visiting Associate Professor of Law, Duke University, spring semester 1964; U.C.L.A. summer, 1964; Senior Fellow, Yale Law School, 1964-1965; faculty, Orientation Program in American Law, Princeton University, summer, 1967. Visiting Professor of Law, University of Mississippi, summer, 1968; Stanford University, spring 1969; University of Denver Law Center, summer, 1969; Project Co-Director of the ABA Commission on Campus Government and Student Dissent, 1969-1970; General Counsel, American Association of University Professors, since 1968. Professor of Law, Duke University, since 1965.



John C. Weistart, A.B., J.D., *Assistant Professor of Law*

A.B., 1965, Illinois Wesleyan University; J.D. 1968, Duke University. Law Clerk to Honorable Walter V. Schaefer, Supreme Court of Illinois, 1968-1969; Editor, *Law and Contemporary Problems*, since 1970. Assistant Professor of Law, Duke University, since 1969.

Emeriti

W. Bryan Bolich, A.B., B.A. (Juris), M.A., B.C.L., *Professor of Law Emeritus*

A.B. 1917, Duke University; Duke University Law School, 1919-1921; B.A. (Juris.) 1923, B.C.L. 1924, M.A. 1928, Oxford University. General practice, 1924-1927; Member North Carolina House of Representatives, 1927; Legal Attache American Embassy, Rome, 1950; Visiting Professor of Law, University of North Carolina, summer, 1951, 1955; University of Houston, spring semester, 1957; Professor of Law, Duke University, 1927-1966; Professor Emeritus of Law, since 1966.

John S. Bradway, A.B., A.M., LL.B., LL.D., *Professor Emeritus of Law*

A.B. 1911, A.M. 1915, LL.D. 1957, Haverford College; LL.B. 1914, University of Pennsylvania. General practice, 1914-1929; Legal Aid Society of Philadelphia, 1914-1920; Chief Counsel, Philadelphia Legal Aid Bureau, 1920-1922; Secretary, National Association of Legal Aid Organizations, 1923-1940; President, 1940-1942; Visiting Professor of Law and Director of the Legal Aid Clinic, University of Southern California, summer, 1928; Professor of Law and Director of the Legal Aid Clinic, University of Southern California, 1929-1931; Vice-president, N.C. Bar Association, 1945-1946; Visiting Professor, University of North Carolina School of Social Work, 1949-1959. Professor of Law and Director of the Legal Aid Clinic, Duke University, 1931-1959; Professor Emeritus of Law, since 1959.

Law Administration

Research Associates—Rule of Law Research Center

Kazimierz Grysowski, M.LL., D.LL., S.J.D.

John W Halderman, AB., LL.B.

Lucretia B. Duke, *Administrative Assistant*

Law Library Staff

Mariana Long, A.B., B.S.M. in L.S., *Librarian*

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Publications Staff

Law and Contemporary Problems Editorial Advisory Board: W. G. Anlyan (Medicine), Philip Handler (Medicine), Arthur Larson (Law), Elvin R. Latty (Law), A. Kenneth Pye (Law), Melvin G. Shimm (Law), John C. McKinney (Sociology), Joseph J. Spengler (Economics), Clive M. Schmitthoff (Foreign Associate, London), Robert R. Wilson (Political Science). Jean T. Muse, *Administrative Assistant*

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Durham Legal Aid Clinic (113 E. Parrish Street)

Charles L. James, *Director*

John W. Woodson, *Staff Attorney*

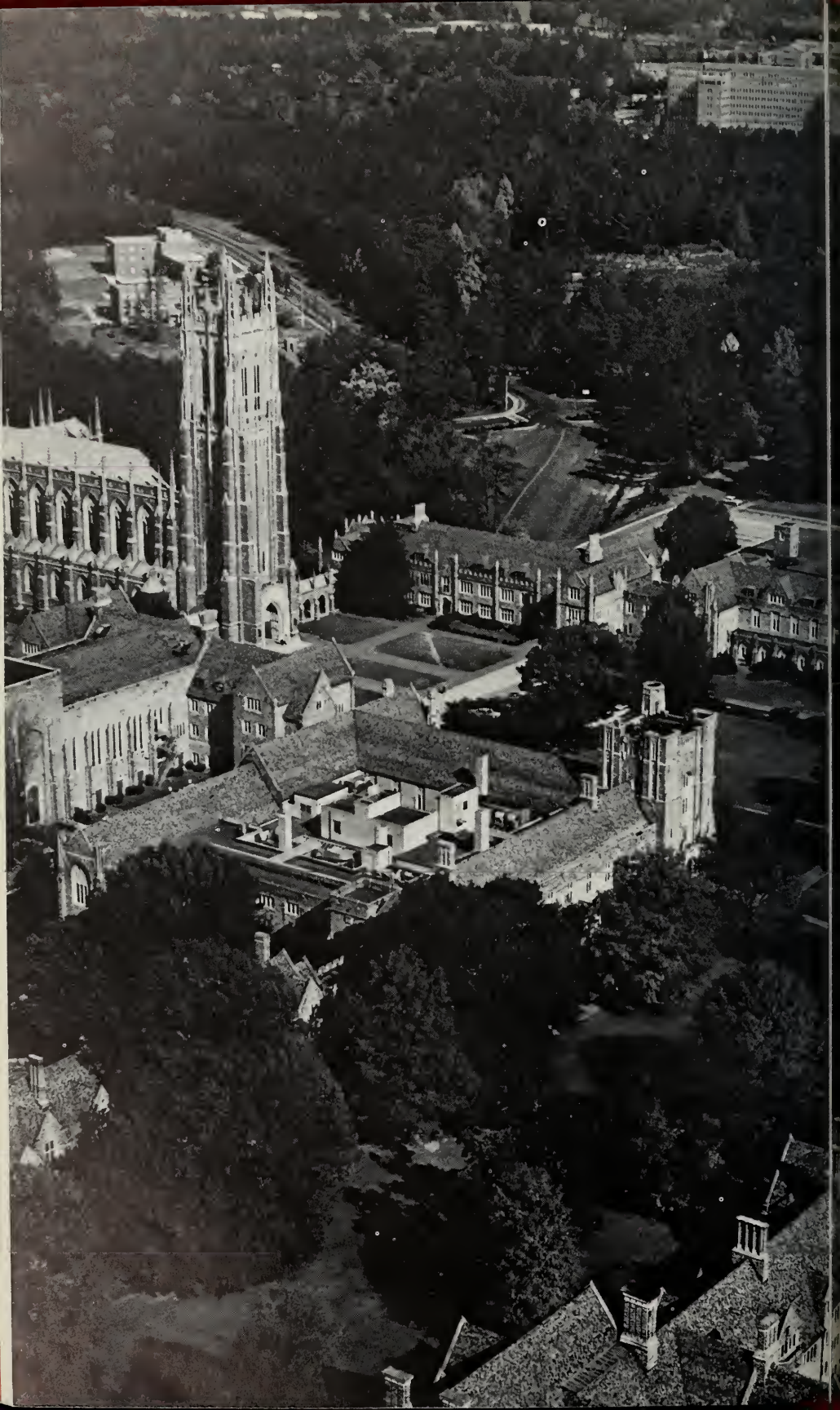
Nicholas A. Smith, *Staff Attorney (part-time)*

Administrative Staff

Irene R. Byrd, *Registrar*

Charles R. Howell, *Administrative Assistant*

Beverley Stallworth, *Administrative Secretary*



General Information

Law School: Its History, Purpose, and Methods

Duke University is built around Trinity College, which goes back in its origin to the year 1838-1839, when Union Institute was founded. The teaching of law as part of a cultural education constituted the beginning of legal instruction in this institution in 1850. Professional education for law began in 1868 when the Department of Law of Trinity College was established. Duke's Centennial year of professional education was celebrated at Law Day 1968.

The modern School of Law was founded in 1904 upon an endowment established by James B. and Benjamin N. Duke. Dr. Samuel Fox Mordecai, distinguished lawyer, scholar, and teacher, organized the School and was its Dean until his death in 1927. The establishment of this School set a new standard in southern legal education, being the first law school in the area to require the completion of two years of college work as an entrance requirement and pioneering in adoption of the case method as the basis of instruction. At an early date three years of resident study was required for the LL.B. degree.

The Law School shared in the expansion incident to the founding of Duke University in 1924. In 1930, with removal to the newly completed law building and the appointment of an enlarged faculty and staff, the Duke Law School entered a new stage of development. The School was reorganized and the curriculum and professional activities were greatly broadened, with the purpose of establishing in the Southeast a progressive Law School of national scope and character.* Throughout its history the law school has emphasized quality rather than quantity in its student body.

*Since the reorganization of the School in 1930, the following scholars have served as Deans or Acting Deans: Justin Miller, 1930-1934; H. Claude Horack, 1934-1947; Harold Shepherd, 1947-1949; Charles L. B. Lowndes, 1949-1950; Joseph A. McClain, Jr., 1950-1956; Dale F. Stansbury, 1956-1957; Elvin R. Latty, 1957-1966; F. Hodge O'Neal, 1966-1968; A. Kenneth Pye, 1968-1970.

The curriculum of the Law School provides thorough preparation for the practice of law in any state. Its graduates have been admitted to the bar throughout the nation. Opportunities for specialization in particular branches of the law are afforded.

In carrying out the trust imposed by the indenture establishing the Duke Endowment, the Law School seeks to have the student acquire knowledge and comprehension not only of legal doctrine, but also of the judicial process and of the social, economic, and political problems with which law and lawyers must deal. The method of instruction employed compels analysis of judicial opinions and inquiry into the nonlegal as well as the legal considerations which underlie them. In appropriate courses, special consideration is given to the work of the legislative and administrative agencies of government. In recognition of the increasing importance of the role of the lawyer in representing private interests before government agencies and in government service, a broad program is offered in the public law field. Opportunity for creative student work is provided by seminar courses and supervised individual study and research. Courses and seminars dealing with consumer protection, law and poverty, race relations, urban problems, criminal procedure, land use planning, and air pollution bring the student in contact with major problems facing the country.

Practical training is not left for the first years of practice. A carefully integrated series of courses is designed to give students actual experience in the work of lawyers. Legal research and writing, moot court work, and procedure in the first year is followed in the second and third years by courses, seminars, and co-curricular activities emphasizing trial techniques, legal planning and drafting, professional responsibility, and legal aid work. A student bar association affords a means whereby the student may gain acquaintance with the professional organizations through which a lawyer may and should contribute to the well-being of his profession and society.

From the Indenture of James B. Duke

"I have selected Duke University as one of the principal objects of this trust because I recognize that education, when conducted along sane and practical, as opposed to dogmatic and theoretical, lines, is, next to religion, the greatest civilizing influence. I request that this institution secure for its officers, trustees and faculty men of such outstanding character, ability and vision as will insure its attaining and maintaining a place of real leadership in the educational world, and that great care and discrimination be exercised in admitting as students only those whose previous record shows a character, determination and application evincing a wholesome and real ambition for life. And I advise that the courses at this institution be arranged, first, with special reference to the training of preachers, teachers, lawyers and physicians, because these are most in the public eye, and by precept and example can do most to uplift mankind. . . ."



Resources for Study

The Law Building. The new Law School building was completed and occupied in September, 1962. Located just off the Gothic core of the West (main) Campus, the building is of modified Georgian architecture with contemporary overtones. It reflects a notable characteristic of the School—a high ratio of facilities to students admitted. Despite long-range plans to keep the student body modest in size, the general spaciousness, number of classrooms and seminar rooms, library reading-room seating, library stack spaces, student carrels, student lockers, four student lounge areas, faculty offices, quarters for legal publications, special quarters for institutional studies and legal aid programs, and courtroom are of proportions ordinarily associated with a far larger student body. The building itself consists of a classroom wing and a library and administration wing, with faculty offices and student activities in both areas.

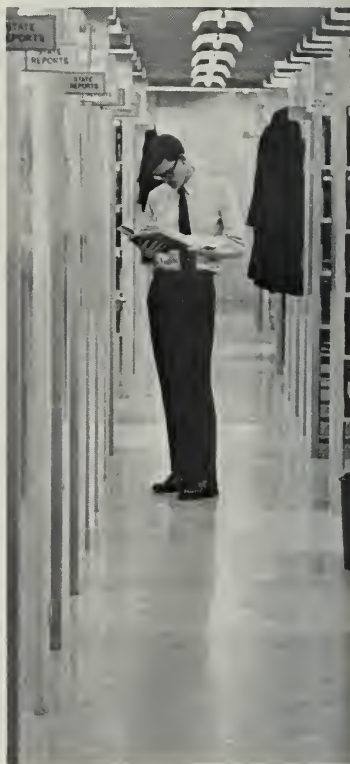
The Law Library. The Law Library is one of the largest law collections in the country. It consists of American and English statutory and case law; collections of international, comparative, and foreign law materials; treatises; digests; encyclopedias; the various selected case series; a comprehensive collection of legal periodicals; and publications in the fields of history, economics, government, and other social sciences, supplemental to the strictly legal materials. The library receives every current legal periodical of general interest printed in the English language and 80 foreign periodicals, and maintains an up-to-date collection of legislation of the United States and of every state.

There are many thousands of additional volumes of a legal nature in the new Perkins Library, as well as the general collection of over two million volumes, to all of which the law students and faculty have convenient access.

The library reading room is unusually spacious in relation to the size of the student body, as are the book stacks interspersed with reading tables. Almost the entire student body can be accommodated in the library at one sitting when the combined seating capacity of the main reading room, the student carrels, and the interstack tables are utilized.



After a national competition, the victorious members of the International Law Society Moot Court team being greeted by Professor O'Neal on their return.



Rule of Law Research Center. In the fall of 1958, the Duke Law School established its Rule of Law Research Center, with Professor Arthur Larson as its Director.

Among the purposes of the center are long-range and current studies and publications bearing on the settlement of international disputes and the achievement of peaceful change under law. Typical projects include several recently published books: *Sovereignty with the Law*, *Propaganda: Toward Disarmament in the War of Words*, *The United Nations and the Rule of Law*, *China and International Agreements*, and *Soviet Public International Law*, and studies of Population Control Laws and Compliance and Enforcement under International Law. The center

publishes a Rule of Law Booklet Series, consisting of reprinted articles by staff members on various aspects of international law. The center also produces studies and publications in the field of the law of civil rights and race relations. A staff of resident lawyers is maintained, with undergraduate law students as research assistants. The staff includes specialists in the world's major legal systems.

Duke Center on Law and Poverty. The Center on Law and Poverty is responsible for a neighborhood legal services office in downtown Durham, staffed by licensed practitioners and third year law students. In addition, the center conducts an extensive summer program for selected law students at the completion of their first year. The center also utilizes second and third year law students to provide academic and field research as well as other assistance to legal aid offices and private attorneys throughout the state of North Carolina.

Publications. The Law School publishes three noteworthy legal periodicals: *Law and Contemporary Problems*, *The Duke Law Journal*, and *The Corporate Practice Commentator* (see *infra*, page 32, for more detail).





Program Information

Juris Doctor Degree

Upon favorable recommendation of the faculty, the degree of Juris Doctor (J.D.) will be conferred upon students who shall have successfully completed six semesters of law study, the last two semesters of work immediately preceding the granting of such degree having been completed in this School.

A student shall be deemed to have completed successfully six semesters of law study if during this period he has completed the following requirements:

1. A passing grade in courses aggregating 84 semester hours;
2. A grade not requiring repetition thereof in every required course; and
3. A weighted average at least five points above passing, whether computed by including or by excluding the grades in the first year courses.

Students who have spent only their last two semesters of study in residence in this School must have received a weighted average at least five points above passing for that year.

Bachelor of Law Degree

Upon favorable recommendation of the faculty, the degree of Bachelor of Law (LL.B.) will be conferred upon students who shall have successfully completed all of the requirements listed above as necessary for the Juris Doctor degree but who were admitted to the Law School without a prior baccalaureate degree. See requirement for admission to candidacy for Juris Doctor degree, page 35.

Curriculum

The curriculum at Duke Law School is not fixed and static. All courses are subject to constant evaluation and the organization of the curriculum itself is sub-

ject to critical examination each year by the faculty. As the frontiers of the law move, as new faculty members are added, and as new intellectual interests develop among students and faculty one can expect to see evolution in the curriculum. The curriculum organization for the academic year 1970-71 is set out below.

First Year Courses. First year curriculum is required for all J.D. candidates.

<i>Courses</i>	<i>Fall semester (s. h.)</i>	<i>Spring semester (s. h.)</i>
Civil Procedure	2	4
Constitutional Law	3	2
Contracts	3	2
Criminal Law	2	
Criminal Procedure		3
Legal Research & Writing*	-	-
Property	2	2
Torts	3	2
Total	15	15

*Instruction in legal research and writing will be conducted in conjunction with the small-class sections of the other first year courses.

Second and Third Years. In the absence of special authorization by the Dean, each student is required to take in each semester courses aggregating not less than 12 and not more than 16 hours.

The program in the second and third years is entirely elective. In planning his elective program, the student must bear in mind that certain courses are prerequisites to other advanced courses:

Antitrust is prerequisite to the Seminar in Antitrust

Business Associations is prerequisite to Business Planning, Securities Regulation, and Seminar in Corporate Planning and Drafting.

Evidence is prerequisite to Trial Practice.

Estate and Gift Taxation and Trusts and Estates I are prerequisites to the Seminar in Estate Planning

Labor Relations I is a prerequisite for Labor Relations II.

Labor Relations I and II are prerequisites to the Seminars in Labor Law and Internal Union Affairs

Personal Income Taxation is a prerequisite to Corporate Taxation, Estate and Gift Taxation, Taxation of Foreign Income, and the Seminars in Taxation and Corporate Insider's Problems

Trusts and Estates I is a prerequisite for Trusts and Estates II

The student should also bear in mind that, although the program in the second and third year is entirely elective, for logical course progression and in order to avoid conflicts in the class schedule it would be advisable for certain basic electives to be taken in the second year and certain other basic electives in the third year. No recommended elective on the following second year list will conflict on the

class schedule with any other elective on the second year list, but it may conflict with any elective on the third year list. Likewise, no elective on the third year list will conflict on the class schedule with any other elective on the third year list.

Second and Third Year Elective Courses and Seminars

SECOND YEAR—RECOMMENDED

<i>Courses</i>	<i>Semester Hours</i>
Administrative Law*	3
Antitrust*	4
Business Associations	2 & 2
Commercial Law	2 & 2
Consumer Protection (not offered in 1970-1971)	3
Evidence*	3
International Law*	3
Jurisprudence*	3
Labor Relations I*	2
Labor Relations II	2
Legal Accounting	2
Personal Income Tax	3
Personal Income Tax Practice	2
Trusts & Estates I	4
Trusts & Estates II	2

*For those intending to take advanced courses and seminars in area.

THIRD YEAR—RECOMMENDED

<i>Annual</i>	
Business Planning	4
Comparative Law (not offered in 1970-1971)	3
Conflict of Laws	3
Corporate Finance	2
Corporate Taxation	2 (3 in 1971-72)
Debtors Estates	3
Estate & Gift Taxation	2
Family Law	3
Federal Courts	3
International Business Transactions (not offered in 1970-71)	3
Labor Standards	2
Land Use Planning	3
Legal Profession	1
Modern Real Estate Financing	3
Regulated Industries	3
Securities Regulation	3
Trial Practice	2
Urban Problems	2
Water Law	2

COURSES OFFERED IN ALTERNATE YEARS

1970-71

Admiralty	2
Intellectual Property	2
Legal History	3

1971-72

Legal History	3
Personal Torts	2
Taxation of Foreign Income	2

SEMINARS

Annual

Civil Liberties & Rights	2
Corporate Planning & Drafting	2
Criminal Law	2
Estate Planning	2
Internal Union Affairs	2
Labor Law	2
Public Welfare & Public Housing	2
Psychiatry & Law	2
Sentencing	2
Taxation	1

1970-71

Corporate Insider's Problems	2
Criminal Procedure	2

1971-72

Air Pollution	1
Antitrust	2
International Organizations	2
Jurisprudence	2
Military Law	2
Racial Discrimination	2
Soviet Law	2
Supreme Court Litigation	2

Individual research for credit, subject to the approval and under the supervision of a member of the faculty, is encouraged.

In addition, the full resources of the University are available to students who wish to pursue limited studies in other disciplines during their second or third year of law study. Subject to faculty approval, courses in other departments may be credited toward the degree requirements of the Law School.

Graduate Study in Law

The law faculty has the power to recommend that the University confer three separate graduate degrees: the degree of Master of Laws (LL.M.), the de-

gree of Master of Comparative Law (M.C.L.), and the degree of Doctor of Juridical Science (S.J.D.). The number of candidates accepted for study in any of these degree programs is extremely limited. No systematic or formal program of graduate instruction exists at Duke Law School. Only in an exceptional case where a faculty member indicates willingness to supervise the work of a student, where the student does not require financial assistance, and where the student has achieved a superior academic record in his undergraduate law studies will an application be accepted. In such a case the course load, the program of instruction, and all other requirements for the degree will be determined by the Dean and the involved faculty member, subject to the approval of the faculty. Any candidate interested in obtaining one of the three graduate degrees of law at Duke should have formulated a specific project of research or interest prior to applying to the School.

Joint Degrees

Combined Medical-Law Degree (M.D.-J.D.). The School of Medicine and the School of Law of Duke University have jointly established a unique program of combined medical and legal education. The aim of the program is to provide a small number of selected individuals with the opportunity to acquire an education in both medicine and law during a six-year course of closely integrated study in the two fields. Upon satisfactory completion of the required course of study, candidates will be awarded both the M.D. and the J.D. degrees.

The student in the M.D.-J.D. Program begins his six year course of study in the School of Medicine. As in the regular M.D. program, his first year is devoted to the basic medical sciences and the second year to the basic clinical disciplines. At this point the student enters the School of Law, where his first year curriculum is the same as that of other law students. During the next two years he selects courses in the Law School which are of special application to his medical-legal interest, and





The U.N. ambassadors of Jordan and Syria on campus for a conference on the Middle East crisis.

his sixth and final year is spent in elective clinical work in the Medical School which may also be tailored to his specialized needs. In addition, the student will be required to complete additional elective basic science work amounting to 18 semester hours, or two summer sessions. His other summers will be unscheduled, but opportunities will be presented to enable the student to engage in medical-legal endeavors suited to his developing interests.

Throughout the six year program the student will have available to him the counsel of faculty members of the two schools to help him in the selection of courses and in the definition of his career objectives.

Applicants for the M.D.-J.D. Program must qualify for admission to both the School of Medicine and the School of Law. In addition, they must apply specifically for admission to the M.D.-J.D. Program. Applications will be passed upon by the Joint Law-Medicine Committee, which is composed of faculty members from the two schools. Personal interviews will be required of all applicants.

Because of the special intellectual demands involved in mastering two professions, high standards will be applied in admitting students to the program. The student will also be evaluated on the basis of motivation and demonstrated interest and likely achievement in the fields relevant to the program's concerns.

In view of the highly specialized character of the field, it is anticipated that enrollment in the program will be limited. Probably no more than three will be accepted in any one year.

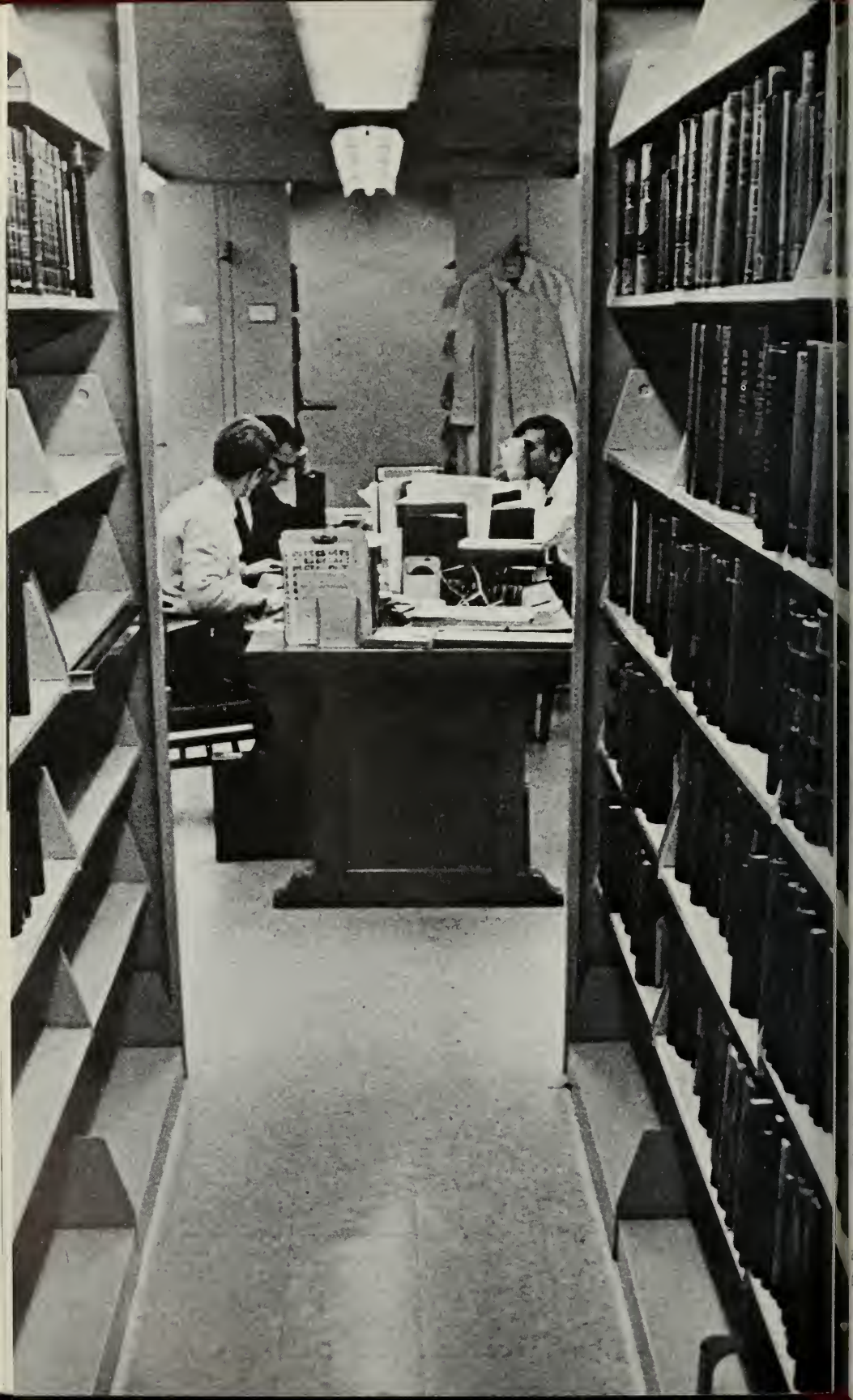
Combined Master of Business Administration-Law Degree (M.B.A.-J.D.).

The School of Law and the Graduate School of Business Administration of Duke University have approved preliminary plans for establishing a program of combined legal and graduate business administration studies. The aim of the program is to provide a small number of selected individuals with the opportunity to acquire an education in both law and graduate business administration in a four year course of closely integrated study in the two fields. Upon satisfactory completion of the required course of study, candidates will be awarded both the M.B.A. and the J.D. degrees.

Although the details of this combined degree program are still in the planning stage at the time of the writing of this *Bulletin*, it is anticipated that the student in the M.B.A.-J.D. Program will begin his first year course of study in either the Graduate School of Business or the School of Law. If the student begins in the Law School his first year curriculum will be the same as that of other law students; if he begins in the Graduate School of Business Administration his first year curriculum will be the same as that of other graduate business students. The student's second year will consist of taking the full first year program of the other school. For example, if a student begins in the Law School his second year will consist of the first year curriculum in the Graduate School of Business Administration. It is further anticipated that in the third and fourth years of the program the student would take a mix of courses in the two schools. Throughout the four year program the student will have available to him the counsel of faculty members of the two schools to help him in the selection of courses and the definition of his career objectives.

Applicants for the M.B.A.-J.D. Program must qualify for admission to both the Graduate School of Business Administration and the School of Law. In addition, they must apply specifically for admission to the M.B.A.-J.D. Program. Personal interviews are recommended for all applicants. It is anticipated that enrollment in the program will be limited.





3

Courses of Instruction

First Year Required Courses

Two sections of Civil Procedure, Constitutional Law, Contracts, Criminal Law, Criminal Procedure, Property, and Torts will be taught. The first year class will be divided unevenly for assignment to two sections of each course. One section of each first year course will be small, with less than 30 students. The other section of that course will contain the balance of the first year class and will be known as the *large section*. Each first year student will be guaranteed one small-section class for the full academic year and yet will study with the balance of his class for all other courses in the large sections of those other courses. Research and writing assignments will be given in conjunction with the small sections of each course. For example, if a student is assigned to the small section in Torts he will automatically be assigned to the large section of his other first year courses. This system enables each student to study with all of his first year classmates and also receive the advantage of small course instruction even in the first year.

Civil Procedure. A study of the adjudication of civil cases with special emphasis on the Federal Rules of Civil Procedure. 2 s.h. fall; 4 s.h. spring.

Contracts. The formation and legal operation of contracts, their assignment, significance to third parties, and relationship to torts, restitution, and commercial law developments; the variety, scope, and limitations on remedies; and the policies, jurisprudence, and historical development of promissory liability. 3 s.h. fall; 2 s.h. spring.

Constitutional Law. The distribution of and limitations upon governmental authority under the Constitution of the United States. Included are study of the doctrine of judicial review of legislative and executive action; the powers of Con-

gress and the President; the limitations on state governmental powers resulting from the existence or exercise of congressional power; and judicial protection against the exercise of governmental power in violation of rights, liberties, privileges, or immunities conferred by the Constitution. 3 s.h. fall; 2 s.h. spring.

Criminal Law. An introductory study of the law of crimes and the administration of criminal justice; analysis of the criminal act and the mental element in crime; consideration of specific offenses as defined by statute and the common law; discussion of typical defenses in relation to specific crimes. 2 s.h. fall.

Criminal Procedure. A study of the basic elements of criminal procedure, with special emphasis upon constitutional requirements, including arrest, "stop and frisk," search and seizure, interrogation, electronic surveillance, the preliminary hearing, bail, criminal discovery, plea bargaining, and prosecutorial discretion. 3 s.h. spring.

Legal Research and Writing. Classroom instruction and individual problems in the use of law books, the preparation of memoranda of law and moot court briefing and argument. No credit.

Property. The basic concepts of real property law and conveyancing. Historical background; estates in land, including the fee simple, the fee tail with its statutory substitutes, the life estate, the estate for years and other nonfreeholds; concurrent ownership; types of future interests, conveyances before and after the Statutes of Uses; landlord and tenant; the modern deed-kinds, delivery, description, title covenants; covenants and agreements running with the land at law and in equity; easements; recording and title registration. 2 s.h. fall; 2 s.h. spring.

Torts. An analysis of liability for personal injuries and injuries to property. After considering "cause in fact," intentionally inflicted harm and the development from trespass to negligence, the course concentrates mainly on the negligence issue. The reasonable man standard, and its application and proof before courts and jury are explored. Limitations such as contributory negligence, lack of duty and proximate cause are considered as are special rules governing owners and occupiers of land. The question of damages is analysed; the course also examines strict liability, the liability of producers and sellers of products, insurance and workmen's compensation. 3 s.h. fall; 2 s.h. spring.

Elective Courses—1970-71

Administrative Law. The formulation of statutory schemes of administrative regulations; the organization of administrative agencies; the determination, promulgation, and enforcement of administrative programs; the respective spheres of administrative and judicial responsibility; judicial control over administrative action. Practice and procedure before administrative agencies: informal conferences and negotiations; formal hearings; constitutional limitations. 3 s.h.

Admiralty. The special body of law governing maritime affairs, especially the transportation of goods and passengers by water. Admiralty jurisdiction; marine insurance; carriage of goods; charter parties; general average; rights of injured seaman and others; collision; salvage; maritime liens and ship mortgages limitation of liability; governmental activity in shipping. 3 s.h.

Antitrust. A study of the federal antitrust laws and their common law background, with emphasis on the economic policies involved, and of specific unfair trade practices and unlawful restraints at common law and under state and federal statutes. Attention is given to a critical examination of legislation designed to enforce competition as the primary control of the economic system; legal measures that supplement or replace competition; price discrimination; fair trade laws; regulation of advertising and boycotts. 4 s.h.

Business Associations. (Mostly corporations, with brief comparison with general principles of agency, partnership, and other non-corporate forms. Emphasis is on the developing federal law of corporations on many of the following topics.) The process of incorporation, promoters and pre-incorporation transactions, distribution of powers within that corporation, workings of the proxy system, special features of the close corporation, duties, and liabilities of insiders, problems in connection with the purchase or sale of any security, shareholders derivative suits and related rights. In addition: generalized treatment of financing of corporate enterprise, governmental regulation of distribution of public issues of securities, dividends and other distributions to shareholders, fundamental changes by recapitalization, merger and other combinations. (Specialized treatment of the above "in addition" topics is reserved for other courses and seminars, particularly Corporate Finance, Securities Regulation, and Business Planning.) 2 s.h. fall; 2 s.h. spring.

Business Planning. This course involves advanced work in corporation and income tax law on a series of basic problems that commonly and currently face business lawyers in the formation and financing of corporations (both close and public), restructuring ownership interests and financing their withdrawal, share repurchases for insiders' strategy, sales and purchase of businesses, merger and other enterprise combination, enterprise division and dissolution. The problems are analyzed, and solutions presented in class discussion and in papers, by an integrated approach that embraces not only questions of corporate and tax law but also of accounting and sales of securities. 4 s.h.

Commercial Law. An integrated study of the law governing commercial transactions, embracing and focusing on the principle headings of the Uniform Commercial Code. 2 s.h. fall; 2 s.h. spring.

Comparative Law. An examination and comparison of the law of selected jurisdictions on certain specific topics. The history, sources, and methods of the civil law will be investigated, discussed, and compared with those of common law countries. Comparative Law will not be offered in 1970-71, but will become an annual course thereafter. 3 s.h.

Conflict of Laws. A study of the special problems which arise when the significant facts of a case are connected with more than one jurisdiction. Recognition and effect of foreign judgments; choice of law; federal courts and conflict of laws; the United States Constitution and conflict of laws. 3 s.h.

Consumer Protection. Studies in the field of "bodily rights" (protection of individual health and safety in the consumption of food and drugs, use of products, services and facilities, and treatment of physical and mental ailments) and "economic rights" (deceptive advertising, credit practices, product and service information and performance). The course will examine current methods of consumer protection—common law, statutes, government agencies—their limits and possibilities as well as consider possible alternatives. 3 s.h.

Corporate Finance. Diverse characteristics of shares and creditor securities, consideration and payment of shares, rights and option in shares, capital and surplus and related accounting concepts, limitations on dividends and share repurchases, impact of federal regulation on promoter's role and public-issue financing, the pervasiveness of "10-5," anatomy of merger, asset and stock acquisitions, alteration and combining of corporations. 2 s.h. [3 s.h. after 1970-71]

Corporate Taxation. An advanced course in corporate income taxation with substantial coverage of tax problems in the organization, re-organization, liquidation and combining of corporations. 2 s.h. (2 s.h. after 1970-71.)

Debtors' Estates. Comparative study of methods used for the liquidation and distribution of debtors' estates. The nonbankruptcy materials cover individual creditor's rights by attachment, garnishment, execution, creditors' bills and the like; common law compositions and extensions; and general assignments. The bankruptcy materials cover, in the main, the first seven chapters of the Bankruptcy Act. 3 s.h.

Estate and Gift Taxation. The principal emphasis of the course is on the federal estate and gift taxes. Consideration is also given, however, to the related portions of the federal income tax dealing with the taxation of the income of estates and trusts and income in respect of a decedent. 2 s.h.

Evidence. A study of the theory and rules governing the presentation of evidence to a judicial tribunal including the function of the judge and jury; the limitations of the adversary system; the concept of relevancy; character evidence; judicial notice; real and demonstrative evidence; authentication of writings and the best evidence rule; competency impeachment, and rehabilitation of witnesses; hearsay and the exceptions to its exclusion; privileged communications. 3 s.h.

Family Law. This course treats of the formation, annulment, and dissolution of marriage, the relationships of husband and wife and parents and child, support of the family, separation agreements, alimony, adoption, and related subjects. 3 s.h.

Federal Courts. A study of the federal courts with respect to the part played by them in achieving a workable federalism. Special attention will be given to the original jurisdiction of the federal district courts, the relationship of the federal courts to state courts and state law, and the permissible and desirable range of federal judicial power. 3 s.h.

Intellectual Property. An introduction to the law of patents, copyrights, and trademarks, with special attention to overlapping problems in these three areas. 2 s.h.

International Business Transactions. Legal framework of U.S. foreign trade and investment; foreign trade and investment laws of selected foreign countries; function of international economic law; international economic agreements; problems of foreign trade and investments. International Business Transactions will not be offered in 1970-71, thereafter it will become an annual course. 3 s.h.

International Law. A survey of public international law of peace, as evidenced especially in decisions of national and of international courts; the drafting and interpretation of treaties; the nature of handling of international claims; the organization and jurisdiction of international tribunals, with special reference to the International Court of Justice; developments with respect to the codification of the law. 3 s.h.

Jurisprudence. Discussion of some of the basic problems of classical and contemporary juristic theory, with application to cases and statutes. 3 s.h.

Labor Relations I and Labor Relations II. A study of the law relating to collective bargaining and concerted labor activities, including the National Labor Relations Act and related legislation, the legal aspects of strikes, boycotts, and picketing, the negotiation and administration of collective bargaining agreements, procedures for the settlement of labor disputes, and relations between the union and individual employees. (Students may take one or both semesters except that Labor Relations I is a prerequisite to Labor Relations II). 2 s.h. fall; 2 s.h. spring.

Labor Standards. Government regulation of conditions of employment, including the Fair Labor Standards Act and other wage-hour and child-labor statutes, unemployment insurance and other social security legislation, and related laws establishing minimum standards for the creation, continuance, and termination of the employment relationship. In addition to other objectives, the course will seek to develop skills in legislative advocacy and procedure, and in the drafting and interpretation of statutes. 2 s.h.

Land Use Planning. A survey of legislative, administrative, and judicial controls utilized to facilitate the orderly development and redevelopment of real property. This consideration will include public and private nuisance, zoning, subdivision control, housing codes, street mapping, and condemnation. The clash of individual and societal interests in land use is explored through cases involving the distinction between valid police power regulations and "takings" for public use which

require payment of compensation. Problems of urban renewal, regional planning, and pollution of water and air will also receive consideration. 3 s.h.

Legal Accounting. An examination and analysis of accounting principles and practices necessary for understanding and investigating facts relevant to a variety of legal problems. The course is designed to familiarize students with the language of accounting, what it discloses and what it leaves unsaid, and how the work of accountants is used by government in regulation of business, by business managers in making decision, by lawyers in solving legal problems, and by investors and lenders in managing and protecting their property. 2 s.h.

Legal History. A study of the development of fundamental English and American legal institutions. 3 s.h.

Legal Profession. A study of the function of lawyers; the organization of legal education and the profession; legal relations between lawyers and clients including fee arrangements and lawyers' liability for malpractice; standards of professional conduct; techniques for making legal services available to persons not now represented. 1 s.h.

Modern Real Estate Financing. An examination of techniques of real estate financing including conventional mortgages, subdivision development, and federal assistance to real estate developers. 3 s.h.

Personal Income Tax. An introduction to federal income taxation with emphasis on the determination of taxable income of businesses, the character of the income realized, and the proper taxpayer on which to impose the tax. 3 s.h.

Personal Income Tax Practice. A continuation of the introduction to federal income taxation with emphasis on the way in which entities such as partnerships, trusts, and estates affect the determination and imposition of the tax, the timing of income and deductions and administrative and judicial procedures used in tax enforcement, settlement, and litigation. 2 s.h.

Personal Torts. A study of the law of defamation, privacy, and infliction of emotional distress from the point of view both of tort law and constitutional law. The availability of tort actions to redress violations of constitutional rights will also be examined. 2 s.h.

Regulated Industries. Government economic regulation in such regulated industries as transportation, broadcasting, and power, plus directed study of specific problems of trade regulation. 3 s.h.

Securities Regulation. A study of the federal and state securities laws and the industry they govern, with emphasis on the mechanics and regulation of the distribution process and trading in securities; subjects dealt with include the functions of the Securities and Exchange Commission, registration and disclosure requirements and related civil liabilities, "blue sky" laws, proxy solicitation and re-

porting requirements, broker-dealer regulation, the self-regulatory functions of the exchanges, and the regulation of investment companies. 3 s.h.

Taxation of Foreign Income. A study of the United States income tax imposed on income from foreign sources and on income of foreign individuals and corporations. 2 s.h.

Trial Practice. A study of the function of the advocate in the trial of law suits, with emphasis upon methods of pre-trial preparation and development of facts in court, typical uses of rules of procedural and substantive law in trial proceedings, and tactical and ethical aspects of problems which confront the trial lawyer. The course is open to students who have completed the course in Evidence. 2 s.h.

Trusts and Estates I and Trusts and Estates II. Non-commercial property dispositions, both testamentary and inter vivos, including the following topics: the estate system, trusts, and powers of appointment as instruments for estate planning; intestate succession; execution and revocation of wills; creation of trusts; class gifts and construction; ademption and lapse; integration of dispositive schemes; charitable trusts; resulting trusts; remedies for wrongful interference with succession and transfer; problems in trust administration; rules against perpetuities, accumulations; and restraints on alienation. Trusts and Estates I (fall) and Trusts and Estate II (spring). (Students may take one or both semesters except that Trusts and Estates I is a prerequisite to Trusts and Estates II. Contracts and Property I are both prerequisites to Trusts and Estates I.) 4 s.h. fall; 2 s.h. spring.

Urban Problems. The institutional setting, role of states and of the federal government, annexation, scope of local government power, intergovernmental relations, legislation by local government, enforcement of regulatory measures, labor-management relations in public employment, financing local government, public expenditures, urban renewal, housing and code enforcement, eminent domain, governmental tort liability. 2 s.h.

Water Law. A study of contemporary issues, legal and otherwise, in water resource management. Consideration will include planning and managing water use, recreation, conservation and aesthetics, and pollution. 2 s.h.

Seminars—1970-71

Seminar in Air Pollution. A study of the legal and economic aspects of air pollution and its legal control, including common law remedies, federal legislation, and state and local control efforts. 1 s.h.

Seminar in Antitrust. Selected studies and directed research and writing in current problems of federal antitrust law. 2 s.h.

Seminar in Antitrust Practice. A study of selected problems of antitrust

practice such as discovery in antitrust cases, the "big" case, private treble damage cases, settlement and consent practice, and problems of enforcement and remedy.

Seminar in Business Torts. The operation of tort law in the market place will be reviewed generally and selected studies will concentrate on problems of current moment. Included are topics such as the scope of the competitive privilege, the use of violence, defamation, and disparagement of competitors, fraud, damages, and appropriation of intangibles. 2 s.h.

Seminar in Civil Liberties and Civil Rights. Studies in the field of personal liberties (freedom of speech, press, religion, association, etc.) and in the field of civil rights (right to non-discriminatory treatment, right to fairness in procedure, etc.). The seminar will be concerned with issues about which the law is unsettled, and especially with issues raised in cases pending before the Supreme Court of the United States. 2 s.h.



Seminar in Corporate Insider's Problems. A study in depth of the legal problems of corporate officers and directors, substantial shareholders, and others who may be classed as "insiders." Subject matter will include tax and corporation law aspects of executive compensation and fringe benefits, special problems under Rule 10-5 and the insider-trading provisions of the Securities Exchange Act of 1934, the strictures surrounding secondary distributions under the Securities Act of 1933, indemnification of officers and directors, the protection of trade secrets, and the enforceability of particular contract covenants. Special emphasis will be placed on practical problems of advising both publicly and closely held corporate clients, estate-planning considerations, and the preparation of documents, particularly executive employment contracts. 2 s.h.

Seminar in Corporate Planning and Drafting. The student is given hypothetical corporate problems (perhaps taken from the practicing lawyer's desk) on a client's proposed course of action; each problem is designed to require the student to grasp the business situation and goals involved, analyze for pertinent legal principles, plan the transaction to avoid legal business (including taxation) pitfalls, plan the requisite steps to consummate the desired transaction, draft the appropriate papers and present his research. 2 s.h.

Seminar in Criminal Law. Current problems in administering criminal justice, including studies of theory and technique in criminal procedure (investigation, prosecution, and defense of criminal charges), inquiry into basic policy in the use of criminal sanctions for the promotion of public order, consideration of contemporary developments (legislative, judicial, and administrative) in substantive and adjective criminal law, and analysis of specific problem areas such as mental responsibility, sexual deviation, attempts, and vicarious liability. 2 s.h.

Seminar in Criminal Procedure. Investigation of crime and the police practices pertinent thereto, including detention and arrest, interrogation, search and seizure; exclusionary rules of evidence; motions for continuance, change of venue, and challenges to the jury; problems of the indigent defendant; discovery problems in criminal trials; post-trial appellate procedures.

Seminar in Estate Planning. Seminar devoted to problems and techniques of tax and estate planning. 2 s.h.

Seminar in Internal Union Affairs. The focus of the seminar is on the internal functioning of labor organizations, with particular emphasis on the application of the Labor-Management Reporting and Disclosure Act of 1959 and that segment of federal decisional law under the Labor-Management Relations Act which considers a union's obligations to its membership. Class sessions are topically structured to consider the union's duty of fair representation, its authority to discipline individual members, its obligations with regard to internal elections and financial integrity, and the limitations upon its demand of loyalty from its membership. Consideration is also given to the relationship of the local union to its international body. 2 s.h.

Seminar in International Organizations. This course covers the principal legal question, including current controversies, affecting the United Nations and other international organizations. 2 s.h.

Seminar in Jurisprudence. An intensive inquiry into specific problems of modern jurisprudential theory. 2 s.h.

Seminar in Labor Law. An intensive examination of significant problems in collective bargaining, union-management relations and labor dispute settlement, with emphasis upon the drafting and interpretation of contract clauses, theories and techniques in contract negotiation, grievance handling, voluntary arbitration and other procedures for the adjustment of disputes, and the interrelation of the legal and economic aspects of labor problems. 2 s.h.

Seminar in Poverty and Law. Lectures and readings cover specific legal problems faced by the indigent in matters of private and public housing, employment, welfare, consumer protection, and in the criminal courts. Topics for research are assigned and papers are presented by participating students. 2 s.h.

Seminar in Military Law. A study of military jurisdiction, the rights of military personnel, the body of both substantive and procedural law that has developed under the Uniform Code of Military Justice; in addition to its other goals, the seminar will seek to develop skills in statutory interpretation and to encourage comparisons between civilian and military criminal law administration. 2 s.h.

Seminar in Psychiatry and Law. An inquiry into the relationship between the science of psychiatry and various legal facets of civil and criminal law, with consideration of the desirability of changes in the law. 2 s.h.

Seminar in Racial Discrimination. This seminar examines the legal aspects of the principal areas of racial discrimination — political and legal rights, public accommodations and facilities, education, employment, and housing — with emphasis on recent federal statutes and Supreme Court decisions. 2 s.h.

Seminar in Sentencing. An examination and discussion of post conviction disposition of criminal offenders. 2 s.h.

Seminar in Soviet Law. A study of the interaction of the law and social structures. The place of the individual in the legal order, Soviet corporate law, conflicts, the regime of aliens, and the regime of foreign trade are also examined. 2 s.h.

Seminar in Supreme Court Litigation. A comprehensive examination of the process of litigation in the Supreme Court by means of intensive study of selected cases to be decided by the Supreme Court in the current term. While no area is foreclosed, for the most part the cases selected will reflect an emphasis on criminal law and civil liberties. Assignments will include preparation of briefs and opinions. 2 s.h.

Seminar in Taxation. A study of the economic, social, and political issues that come into collision in our income tax law, and the process by which these issues are compromised and settled in the legislative process. Seminar will not be taught in 1970-71 but will become an annual Seminar thereafter. Enrollment is limited. 1 s.h.

Seminar in Workmen's Compensation. The main elements of Workmen's Compensation Law of the United States are covered through the assignment of typical office problems on which legal memoranda or opinions are prepared. 2 s.h.

Seminar in World Law. The emphasis of this course is on those aspects of national law and international law which have an important influence on weakening or strengthening a world legal order. The course does not duplicate the material in the regular course on International Law. 2 s.h.





Student Life at Duke

Living Accommodations

Housing. The Duke University Graduate Center provides accommodations available to men and women law students. In addition, women enrolled in the Law School may reside in the Town House Apartments, which are complete with basic furnishings, utilities, and maintenance. In addition, there are numerous private apartments and rooms proximate to the campus in the town or in the surrounding countryside.

A resident student, in order to retain his room for the succeeding academic year, must make application at the Office of Housing Management for confirmation of the reservation.

The authorities of the University do not assume responsibility for persons selected as roommates. Each student is urged to select his roommate when the room is reserved. Any student who occupies a double room without a roommate will be given written notice from the Housing Office to obtain a roommate or he may be required to pay the rental consideration for the whole room.

Any exchange of rooms must be made at the Office of Housing Management. Persons exchanging rooms without the approval of the Housing Management Office will be subject to the charges for both rooms.

Residence hall rooms may be reserved by new applicants after they have been accepted officially for admission to the School of Law. Applications for residence hall rooms are to be made to the Office of Housing Management, Duke Station, Durham, North Carolina 27706. For fee and deposit details see page 41. Because of the convenience and variety of off-campus housing in the Durham-Chapel Hill area, most students, both married and single, choose apartments off-campus, at least after the first year of law study.

*Information pertaining to graduate housing facilities is subject to change prior to September, 1970.

Food Service. Food service is cafeteria style. The cost of meals runs approximately \$2.50 to \$3.00 per day, depending on the needs and tastes of the individual. The dining facilities on the West Campus include two cafeterias, a grill, and the Oak Room with table service. In the Men's Graduate Center there is a cafeteria and a coffee lounge. The prices in these dining rooms are the same as on the West Campus.

Placement Service

With alumni in every state and in foreign countries, placement of its students has been one of the Duke Law School's most successful endeavors. The Dean and the Assistant Dean in charge of placement maintain close contact with outstanding law firms and other potential employers throughout the country.

Duke was the first law school to initiate the *Placement Bulletin*, an idea since adopted by a number of other schools. This *Bulletin*, which is under the editorial supervision of students, lists the members of the prospective graduating class with their pictures, relevant biographical data, and career preferences. This publication is widely circulated among selected law firms, companies, government agencies, and public service organizations throughout the country and has proven an effective part of our placement program.

Placement at Duke is a three-pronged endeavor. The major burden of the on-campus placement program is carried by the potential employers themselves through on-campus interviewing. Each year more representatives of varied kinds of firms visit the Law School than there are graduates available, and most are seeking more than one student. Quite significantly, the number of interviewers has been rising rapidly in recent years and most of the best known firms in the country will be found on the list. The second program is the maintenance of a lengthy inquiry list by the Placement Office. Firms which cannot interview, but do wish to hire, place their names on this list. In addition, inquiries are received by individual employers (through the *Placement Bulletin*) and by the Dean from other firms wishing to hear from students. Frequently mutual interest calls for a brief visit to the firm's offices to become better acquainted with the factors affecting a decision. The third major effort must be made by the students themselves. Third year students, particularly, must be willing to conduct extensive letter writing and visits to areas in which they desire to practice.

Students are involved more deeply in placement activities in the fall of their third year of study. However, Duke Law School also places most of its students in various kinds of summer legal internships following the second year. Generally, work in law offices is not recommended after only one year of law study.

Medical Care

With the exceptions noted below, full medical and surgical care is furnished to all regularly matriculated law students of the University who have paid the semester tuition. This service is under the direction of the physician in charge with the cooperation of the staff of Duke Hospital. It includes hospitalization (limited to thirty days), medical and surgical care, drugs, dressings, X-ray studies, and ward (but not special) nursing. A charge for board is made at the same rate as

in the University dining halls. Refraction of eyes and treatment of teeth and of all chronic and pre-existing conditions, such as diseased tonsils, hernia, elective surgery, chronic skin conditions, and endocrine disturbances, or accidents or illnesses occurring during vacations or while off the campus are not included in this service. The cost of any necessary braces and orthopaedic appliances, as well as special nursing, must be borne by the patient. If the student has insurance providing hospitalization, surgical, or medical benefits, the benefits shall be applied to the cost of his medical care.

Employment Opportunities for Students and Wives

Although it is not advisable for a law student to undertake any substantial amount of outside work, particularly in the first year, arrangements have been made to provide part-time employment for capable law students who otherwise would be unable to meet the expense of studying law at Duke. A number of positions in the law library are filled by law students. Students are often employed in their second and third years as research assistants for faculty members. The University maintains a general placement office to aid in finding employment, and several law students serve as undergraduate residence advisers if they have been at Duke one year or have previously held such positions.

The opportunities for employment in the University and surrounding community are excellent for wives who are teachers, nurses, or secretaries. Other types of desirable positions are also available. In recent years, about one half of Duke law students have been married. Many of them have been better able to pursue their studies because their wives have been able to contribute to this investment in their futures. The Dean's office maintains a list of superintendents of schools in nearby districts that is available upon request to wives of incoming first year students. The University Personnel Office, 2106 Campus Drive, assists wives with secretarial skills to locate suitable employment.

Professional and Honorary Organizations

Order of the Coif. The Order of the Coif is a national legal scholarship society, with a local chapter at Duke University School of Law. Its purpose to "to foster a spirit of careful study and to mark in a fitting manner those who have attained a high grade of scholarship." Election is restricted to the upper 10 percent of the graduating class who have attained the most distinguished academic records in their law school work.

The Duke Bar Association. The Duke Bar Association coordinates the professional, social, and other extracurricular activities of the student body. The association resembles in its composition and purpose both a university student government and a professional bar association. It publishes the *Placement Bulletin*, manages the speakers program, publicizes Law School activities, and sponsors athletic and social programs. In 1969 it was selected as the outstanding Student Bar Association in the nation. Dues are \$15.00 per annum, payable in September.



A Law Day Reunion: Charles S. Rhyne '37, former President of the American Bar Association; Robert C. Finley '34, Chief Justice of the Supreme Court of Washington; Professor Elvin R. Latty; and Richard M. Nixon '37, President of the United States.



Professor F. Hodge O'Neal talking with former Attorney General Ramsey Clark.

Legal Research Program. The Legal Research Program, supervised by a student editorial board, provides second and third year students with an opportunity to prepare legal memoranda on actual problems submitted by practicing lawyers, judges, or legislative committees. The program also assists in providing representation to indigents in appeals from denials of petitions for *habeas corpus* in the United States Court of Appeals for the Fourth Circuit. The briefs are written by the students under the supervision of a member of the faculty who argues the case.

Moot Court Board. A program of student Moot Court arguments in which all first year students are required to participate is conducted under the supervision of the Moot Court Board. In addition, there is an intramural program for upperclass students from which a team is selected each year to represent the Law School in the National Moot Court competition.

The Duke Legal Internship Program. This program places students in summer positions with prosecuting attorneys, public defenders, and court-appointed defense counsels, thus providing practical experience in a variety of problems involving the criminal law.

International Law Society. The Duke International Law Society provides an annual program for examining the application of international law to world problems. Through a series of lecture discussions in the fall called "A Short Course in International Law" and by featuring distinguished speakers in the field throughout the year, the society provides its members the opportunity to make contact with the men and ideas that are shaping the development of international law.

Other activities include participation the annual Philip C. Jessup International Law Moot Court competition, attendance at conferences sponsored by the Association of Student International Law Societies, and sponsorship of a biennial conference on a selected topic of international significance.

Membership is open to all law students with dues of \$5.00 per annum.

Legal Fraternities. The two legal fraternities at Duke are Hughes Inn of Phi Delta Phi and Wiley Rutledge Chapter of Phi Alpha Delta. During the academic year, these organizations sponsor luncheons and other meetings, which feature topics of professional interest and a number of social activities.

Prizes and Awards

Several academic prizes and awards have been established by the Law School or are sponsored by individuals or organizations to recognize general academic excellence or high achievement in specific areas. The following, although not a complete list, will indicate some of the academic prizes and awards available each year to law students who distinguish themselves.

American Jurisprudence Prize Awards. American Jurisprudence Book awards are made to the student in each course who obtains the highest scholastic grade in that course. These book awards are sponsored yearly by the Lawyers Co-operative Publishing Company.

Corpus Juris Secundum Award. This award, sponsored by the American Law Book Company, is made to the student in each class who has made the most significant contribution to overall legal scholarship.

Hornbook Series Award. This award, sponsored by the West Publishing Company, is made to the student in each class who has obtained the highest scholastic average in his class for the year.

Nathan Burkan Copyright Award. Each year the Nathan Burkan Memorial Competition offers an award of \$250 to the student who writes the best paper on Copyright Law.

Prentice-Hall Tax Prize. An award, sponsored by Prentice-Hall, Inc., is made to the graduating senior who has made the most outstanding record in the courses in federal taxation.

Student Advocacy Award. An award made to the graduating senior, selected by the faculty, who has demonstrated the most outstanding ability in courtroom advocacy. This award is sponsored by the International Academy of Trial Lawyers.

United States Law Week Award. This award is made to a graduating senior selected by the faculty as the student who has made the greatest academic progress during his final year of study. It is sponsored by the Bureau of National Affairs, Inc. and consists of a year's complimentary subscription to *United States Law Week*.

Will Drafting Contest. In order to encourage good draftsmanship of wills, the North Carolina National Bank of Charlotte, North Carolina, each year conducts a will drafting contest which is open to all law students of the University of North Carolina, Wake Forest University, and Duke University who are not already members of the Bar. Prizes of \$50 each are awarded for the two best entries from each law school. The best of these six entries receives an additional award of \$150. The second best entry receives an additional \$50 prize.

Willis Smith Award. This award is presented annually to the member of the graduating class who has achieved the highest academic average for his three years of law study. The award is sponsored by the family of United States Senator Willis Smith, a deceased alumnus, and consists of a set of legal volumes selected by the recipient of the award.

Recreational Facilities

The University is located about two miles from the business district of Durham on wooded hills constituting part of the 8,000-acre Duke Forest. Within a short distance from the campus are facilities for golf, horseback riding, and woodland hiking. Students of the Law School are entitled to the use of the University gymnasium, tennis courts, swimming pool, golf course, and similar privileges. Other opportunities for physical activity are available in the Intramural Program, as well as through such activity groups as the outing, sailing, and cycling clubs. Skiing has become increasingly popular. Several bowling alleys are available in and near Durham. Concerts, recitals, lectures, and plays are presented frequently on the campus.

Publications

Law and Contemporary Problems. The School of Law publishes a quarterly *Law and Contemporary Problems* edited by Assistant Professor John C. Weistart. This distinguished periodical, now in its thirty-fourth volume, presents in each issue a symposium in which writers of special competence from a number of disciplines discuss a particular problem of current importance. Editorial assistantships are available to second and third year students not writing for the *Duke Law Journal*. Individuals are selected for these positions on the basis of achievement and receive stipends for their work.

Duke Law Journal. American legal education boasts at least one unique institution. Only in America, and only in law, are the scholarly professional journals edited and largely written by students. The *Duke Law Journal* carries forward this proud tradition, which dates from the latter part of the nineteenth century. Articles written by teachers, lawyers, judges, and other scholars are critically evaluated and edited by the board of student editors. Notes and comments concerning recent judicial, legislative, and other developments are written by the students themselves and edited by their fellow students. The *Law Journal*, with six issues annually, has had a profound influence on the growth and development of the law.

Membership on the *Journal* is among the highest honors that can be attained by a student. Moreover, in the opinion of many, the experience gained in this work provides the best training that the Law School has to offer. It should be the aim of every qualified student to take advantage of this opportunity. Every student can seek membership by participating in the *Duke Law Journal's* Contributor Program.

Corporate Practice Commentator. The *Corporate Practice Commentator*, a quarterly periodical devoted to significant developments and new thinking in the field of corporation law and practice, published by a commercial concern, is edited by Professor F. Hodge O'Neal at Duke. The *Commentator* gives attention to matters of interest and importance to counselors and managers of corporate and other business enterprises, with articles on corporation law and practice, antitrust questions, labor matters, patents and copyrights, executives' compensation, fair trade legislation, and other matters arising from business activities.





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Admissions, Registration, and Finances

Admission

Juris Doctor Degree. First year students may enter only at the opening of the fall semester in any year. Students who have completed the first year of law study at this or any other law school approved by the Association of American Law Schools may enter at the beginning of any semester.

An application for admission to Duke Law School as a candidate for the degree of Juris Doctor may be submitted by any person who is a graduate of a college of approved standing. Applicants will be considered without regard to race, creed, religion, sex, or national origin. Applications may be submitted by a candidate without a prior baccalaureate degree if he has completed in a college of approved standing work equivalent in number of units to three-fourths of that required for graduation and whose college work is of unusually excellent quality and in its entirety shows an average grade far above that required for graduation, the requirement in each case being determined by the regulations of the college where the work was taken. Graduates who have been admitted under this latter provision will be awarded the degree of Bachelor of Laws (LL.B.).

Combined Course Program. A number of colleges, upon application by their students, have permitted those who have completed three years of undergraduate work to enter the Duke Law School and upon the satisfactory completion of the first year of law school work to receive their Bachelor of Arts degree from such colleges. It is suggested that students desiring to enter Duke Law School under such a program make inquiries of their proper college authorities regarding this point if they meet the applicable requirements for admission. A student from an undergraduate college of Duke University who has completed therein three years of study may apply to that college to enroll in a combined course wherein his first year of law study may be accepted toward the Bachelor of Arts degree.

After receiving the Bachelor of Arts degree and completing four additional

semesters of law study, a student in the combined course program will receive the degree of Juris Doctor. Less than 5 percent of an entering class is admitted on this basis.

Students considering entrance before obtaining the bachelor's degree should consult the rules of the Board of Bar Examiners in the state where they plan to practice law, for regulations applicable to this program.

Advanced Standing. Any person who has complied with the requirements for admission set forth in this *Bulletin* prior to the commencement of his law study, who presents evidence of the satisfactory completion of at least one year of study at any law school which is a member of the Association of American Law Schools, and who is eligible for readmission to the law school from which he proposes to transfer, may be admitted to advanced standing, subject to such rules as would be applicable to students in this School having a comparable scholastic record. Provisional credit for courses so completed will be given, with final credit contingent upon the completion of at least one full year of law study in this School with satisfactory grades. Adjustment of credit for work done in other law schools may be made by the Dean or by vote of the faculty.

Joint Degree Programs. Any person interested in applying for admission to the M.D.-J.D. program (described on page 11 of this *Bulletin*) must meet both the admission requirements of the Duke University School of Law as a candidate for the J.D. degree and the admission requirements of the Duke University School of Medicine as a candidate for the M.D. degree. An applicant for the M.D.-J.D. degree should apply to both the Law School and the Medical School and must be accepted by both schools before he can apply for candidacy for this combined degree. For information on Medical School admissions the prospective applicant should write Admissions Office, Duke Medical School, 111 Davison, P.O. Box 2901, Durham, North Carolina 27706.

Any person interested in applying for admission to the M.B.A.-J.D. program (described on page 13 of this *Bulletin*) must meet both the admission requirements of the Duke University School of Law as a candidate for the J.D. degree and the admission requirements of the Duke University Graduate School of Business Administration as a candidate for the M.B.A. degree. An applicant for the M.B.A.-J.D. degree should apply to both the Law School and the Graduate School of Business Administration and must be accepted by both schools before he can apply for candidacy for this combined degree. For information on Business School admissions the prospective applicant should write Admissions, Graduate School of Business Administration, 114 Social Science, Duke University, Durham, North Carolina 27706.

Admission Procedures. Application must be made on the prescribed Law School forms which are available upon request. A fee of \$15 is charged for processing an application and a check or money order for this amount should accompany the application. No applicant will be accepted until all required documents are on file. These documents are:

1. The application itself, to which a recent personal photograph must be attached.

2. Transcripts of all college and graduate academic records.
3. A report of the applicant's score on the Law School Admissions Test described below.
4. Three completed reference forms, one of which should be completed by an appropriate academic dean at the school last attended. References should be requested to return their forms directly to the Registrar, Duke University, School of Law, Durham, North Carolina 27706.

Most applicants apply while they are still in college, either in the fall or winter of their current college year. The Law School does not ordinarily wait for the completion of the current year's college work before admitting an applicant; normally it takes action on the basis of a transcript showing college work through the junior year although, at times, it may request a supplementary transcript also showing one term of the senior year. Such acceptance is subject to final action taken in the light of the further supplemental transcripts showing all the college work required for admission to the Law School. (However, it would be extremely rare for an accepted applicant to be rejected later on the basis of his completed transcript.) The suggested time for application by a student in college is the fall semester of his final year.

The Law School Admission Test, referred to previously, is administered by the Educational Testing Service. It is given periodically at examination centers conveniently located throughout the United States and at special foreign centers. The test administration date in the fall semester of the applicant's final year of undergraduate study is preferred, but not required. No special preparation for the test is suggested, since it is designed to measure aptitudes, abilities, and general background rather than knowledge of subject matter. The applicant's score on the test will be considered along with other data in passing upon his admission to the Law School. Application forms and information should be procured by writing directly to the following address: Law School Admission Test, Educational Testing Service, Box 944, Princeton, New Jersey 08540.

Personal interviews are recommended, but not generally required. Whenever possible, a visit to the Law School is especially helpful both to the applicant and the Admissions Committee.

Registration and Regulations

Registration. All students are required to register on the dates prescribed in the Law School Calendar (*supra*, page v) at which time class schedules and course cards must be completed and approved. A student's registration for any semester is not complete until he has settled all indebtedness with the Office of the Bursar.

A student may alter his registration by enrolling in or withdrawing from a course during the first week of the semester. Thereafter, no further enrollment will be permitted, and withdrawal from a course is allowed only with the consent of the professor and the Dean or Assistant Dean.

Academic Regulations and Course Requirements: No regular student is permitted to take less than 12 course hours per semester. No first year student may take courses in excess of the first year program. Second and third year students are



not permitted to take for credit more than 16 course hours per semester, nor may they audit and take for credit more than 17 course hours per semester.

In exceptional cases, with the consent of the Dean, a student may take more or less than the prescribed maximum or minimum loads, but no student shall receive full residence credit if he takes fewer than the ten hours per semester for credit required for approved schools by the American Bar Association.

Scholastic Standards. The grading system is now under study by the faculty. The following grading system is currently in effect:

- A — 80-100
- B — 70-80
- C — 55-70
- D — 50-55
- F — 45-50

Numerical grades are reported to students and are utilized in computing student averages. Letter grades are employed on transcripts with a scale of equivalence. Rank in class information is utilized only for very limited internal purposes (i.e., election to Order of the Coif, some awards, and *Law Journal* selection) and is not released to individual students or to prospective employers. Students are free

individually to release their cumulative grade averages or their individual course grades to prospective employers. If a student does choose to release such information, the prospective employer may verify the accuracy of such released information with the Registrar.

Eligibility to Continue Law Study. Any student who at the end of his first year, or at the end of any subsequent semester, has an average grade lower than *D* (49 or lower on the numerical scale) on all the work then taken is ineligible to continue his work in the School. Any other student whose average grade at the end of any subsequent semester on all the work then taken is below *C* (54 or lower on the numerical scale), or who in any single semester or in single year receives failure grades in courses totaling eight or more semester hours, may at any time be declared ineligible to continue by the Dean.

Notification of Unsatisfactory Scholastic Standing. Every student subject to the provisions of the second sentence of the paragraph above, who has not been declared ineligible to continue his work in the School will be given a formal, written notice by the Dean's office. This notice will set forth his average grade or grades and inform him that he will be subject for the ensuing year to the special supervision of the Dean, who may order his dismissal from the School in the event of his failure to maintain a satisfactory scholastic standard, and that he will be ineligible to receive a degree unless his work meets the scholastic requirements for graduation, which will be set forth in full in such notice.

Every other student whose average final grade at the end of any semester on the work of that semester, or on all work then taken, does not exceed the minimum average grade required for graduation by more than two points will be given a notice similar to that provided for above.

Attendance Regulation. Regular class attendance is required. The right to take the examinations, as well as the privilege of continuing one's study in the School of Law at any time is conditioned upon regular attendance at the exercises of the School.

Regulations Governing Withdrawal for Military Reasons. A student in good standing enrolled in a one semester course who withdraws from the Law School in order to enter military service after the end of the eleventh week of the semester (measured from the first day of class) will be eligible to submit a paper in a seminar or undertake a special examination in a course on a *pass/fail* basis. Credit will be awarded for the course if the grade of *pass* is received on the paper or examination.

A student in good standing enrolled in a one year two semester course who withdraws from the Law School in order to enter military service after the end of the eleventh week of the second semester will be eligible to undertake a special examination on a *pass/fail* basis. Credit for the entire course will be awarded if the grade of *pass* is received.

A student in good standing who is required to withdraw from the Law School to enter military service before the time periods set forth in the preceding paragraphs may nevertheless be permitted to take a special examination on a *pass/fail*

basis in a course or submit a paper in a seminar at the discretion of his professor in unusual circumstances where, in the opinion of the professor, the performance of the student justifies such action.

Nonacademic Regulations: Motor Vehicles. Each motor vehicle operated on the campuses by students enrolled in the School of Law must be registered at the Traffic Office within five days after arrival, and thereafter must bear the proper registration emblem. To register a vehicle, the student must pay the prescribed fee (see page 42) and present the following documents:

1. State vehicle registration.
2. State operator's license.
3. Evidence of automobile liability insurance as required by North Carolina law: \$10,000 per person and \$20,000 per accident for personal injuries, and \$5,000 for property damage.

Parking, traffic, and safety regulations will be given each student registering his vehicle. Students are expected to abide by these regulations.

The Honor System. The honor system of Duke Law School demands of each student the highest standards of academic and professional conduct, subject to the judicial code promulgated by the students and approved by the faculty. The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University as currently in effect or, from time to time, are put into effect by the appropriate authorities of the University.

Registration for Bar Examination. Many states now require that a student, prior to or shortly after beginning the study of law, register with the board of bar examiners of the state if he intends to practice therein. Each student should ascertain by writing to the secretary of the board of bar examiners of the state in which he plans to practice, or by other channels of information, whether that state requires registration. Entering first year students are advised to check the bar requirements of their home state, or any other state they may plan to practice in, within 45 days after registration for their first semester's work at the Law School.

Financial Information

Fees and Expenses. The cost of providing a legal education of the quality offered by the Duke Law School is high and has been steadily increasing. Tuition provides only a part of the funds necessary with the remainder provided by income from endowment, grants, and from gift support of alumni and friends.

Tuition. Tuition at Duke is due and payable not later than the day of registration for a particular semester. For the academic year 1970-71, the tuition is \$950.00 a semester (\$1,900 for both semesters of the academic year). It is expected that tuition for the academic year 1971-72 will be \$1,050 per semester (\$2,100 for both semesters of the academic year). After the final day of registration no refund in tuition will be made except for involuntary withdrawal to enter military service.

General Expenses. Students should be aware that the following estimates were compiled in the spring, 1970, and appropriate alteration of these estimates should be made to reflect any inflationary increases that may have occurred in the general economy since that date. It should also be recognized that the expenses of a Duke law student may vary considerably according to the style of living he assumes and such variables as distance of travel and whether he has a family. However, present expense levels for tuition, lodging, board, books (\$120 to \$200 if purchased new), supplies, transportation, and personal effects should fall within the following ranges: \$3,800 to \$4,400 for single students; \$5,000 to \$6,100 for married students; and, \$5,700 to \$6,800 if married with one child.

Registration Deposit. Admitted applicants are required to deposit the sum of \$100 with the Office of the Bursar. Except for involuntary withdrawal to enter military service, this deposit is nonrefundable but will be credited to the account of the matriculated student.

Housing.* The Graduate Center is available to men and women enrolled in the Law School. Most rooms are equipped for two persons and the rental charge for a double room is \$325.00 for the academic year for each occupant (\$162.50 per semester for each occupant). The charge for single room occupancy is \$420.00 for the academic year (\$210.00 per semester).

Women may also reside in the Town House Apartments which are complete with basic furnishings, utilities, and maintenance. Three persons occupy each apartment. The rental charge for the academic year is \$495.00 for each occupant (\$247.50 per semester).

Detailed information about University housing facilities for single and married students, including rental rates, will be provided upon request by the Director of Housing Management, Duke University, Duke Station, Durham 27706.

Room Deposit. A \$25.00 deposit is required of each applicant before a residence hall room reservation is made. The initial room deposit is effective during the student's residence in the University residence halls if attendance is continuous in regular academic years.

Refund. The deposit will be refunded under the following conditions:

1. Within thirty days after the student has been graduated provided written notice is received at the Office of Housing Management requesting refund.
2. Upon withdrawal from Duke University residence halls by students enrolled on the semester basis, provided written notice is received by the Director of Housing Management by August 1 for cancellation of a reservation for the fall semester, and not later than January 15, for cancellation of a reservation for the spring semester.
3. When the reasons requiring withdrawal are beyond the student's control.

No refund will be made until the occupant has checked out of his room through the Housing Office and has settled his account with the Bursar.

Rooms are rented for the academic year but for no period of less than one semester without special arrangements. After the day of registration, no refund of room rent will be made except for involuntary withdrawal to enter military service.

*Information pertaining to graduate housing facilities is subject to change prior to September, 1970.

Such refunds will be made in accordance with the University's established schedule. Regulations governing the occupancy of rooms will be supplied by the Director of Housing Management to those students who make application for housing.

Food Service. Food service is cafeteria style. The cost of meals runs approximately \$2.50 to \$3.00 per day, depending on the needs and tastes of the individual. The dining facilities on the West Campus include two cafeterias, a grill, and the Oak Room with table service. In the Men's Graduate Center there is a cafeteria and a coffee lounge. The prices in these dining rooms are the same as on the West Campus.

Late Registration Fee. Students who register in any semester at a date later than that prescribed are required to pay to the Office of the Bursar a \$10.00 penalty for late registration.

Athletic Events Fee. Law students may secure admission to all regularly scheduled University athletic contests held on the University grounds during the entire academic year by payment of the athletic fee of \$25.00 per year plus any taxes that may be imposed. (This fee is payable in the fall semester.) They also may use the facilities of the Duke golf course upon payment of student green fees.

Motor Vehicle Registration Fee. Each motor vehicle operated on the campuses by students enrolled in the School of Law must be registered at the Traffic Office in the Social Science Building, and a \$30.00 annual registration fee (\$10.00 for two wheeled vehicles) must be paid at this time by students residing on campus.

Scholarship Aid

University Scholarships. The Law School recognizes that many students are unable to pay the full cost of their legal education and the University has established a number of University scholarships to assist students who need financial aid. In addition to committing fully its present scholarship resources each year, continuous efforts are underway to develop new sources for scholarship funds. At present Duke Law School does not have the resources to provide scholarship assistance to all students who need it. Most students are required to rely heavily on loan funds to meet their needs. Fortunately there have been very few Duke students who have been required to interrupt their legal studies because of financial problems.

The scholarships that are available vary widely in amount. Except for a few scholarships that are based purely on merit, scholarships are awarded only to needy applicants with markedly superior college records and comparable Law School Admission Test scores. Most scholarships awarded by the Law School cover part or all of the tuition charge. In cases of exceptional merit and need, a few scholarships may consist of full tuition and a stipend. The more usual form of financial aid is a combination of scholarship and loan. Scholarship grants are renewable for second and third year students who maintain an outstanding standard of work. A student seeking scholarship aid should file a scholarship application *at the same time* as he files his application for admission.

B. S. Womble Scholarship. The B. S. Womble Scholarship has been established by a distinguished Duke alumnus, B. S. Womble, and members of his family. The scholarship is awarded on the basis of the moral character, scholastic ability, seriousness of purpose, and leadership potential of the applicant.

Beard-Rees Scholarship. This scholarship has been established to honor the memory of Robert L. Beard and David W. Rees of the class of 1964 by their classmates and friends.

Martha Garner Price Fellowship. This fellowship was created by a gift to the Rule of Law Research Center by the children of Ralph Price—the late Clay Price, Julian Price, and Louise (Mrs. Young Smith), in memory of their mother, Martha Garner Price. The purpose of the fellowship is to support advanced research in the field of international organization.

Scholarships for Disadvantaged Students. Duke University has established a limited number of scholarships for disadvantaged students which include full tuition and living expenses.

Loan Aid

Prospective law students who will need loan funds to help finance their education should apply immediately following their acceptance for admission. Loans are available to Duke students under the student loan program established under the National Defense Education Act. Interest on these loans begins to accrue at 3 percent nine months after the student leaves the School, and repayment normally begins ten months after the student leaves the School, with complete repayment scheduled over a period up to ten years.

Most states have now established guaranteed loan programs with similar terms for graduate and undergraduate study by their own residents. The Law School will supply information regarding any particular state and will make appropriate certifications in support of the loan application. If loan funds prove unavailable through the state guaranteed loan program, the student should apply directly to Duke University.

Limited financial assistance in the form of loans from funds held in trust by the University are available to qualified law students. Interest on these loans, which mature after the student has left the School, accrues from the date of each note at the rate of 1 percent until the student has left the School and for five years thereafter at 3 percent per year, with repayment in installments over the five year period. Active efforts are also underway by the University administrators to develop greater loan reserves for Duke students.

Approval of a loan application is based on the financial need, satisfactory scholastic standing, and personal integrity of the applicant.

In addition to the loans above mentioned, the School participates in the American Bar Association Loan Fund and United Student Aid Fund programs. These programs provide guaranteed commercial bank loans to needy law students.

A special fund is also available to law students for small loans to meet temporary financial emergencies arising during the course of the year.

Appendix

Former Schools of Duke Law Students

Students at the Duke University School of Law are graduates of colleges and universities located in all sections of the United States. The 300 students enrolled at the Duke Law School in 1969-70 pursued their undergraduate studies at 153 different institutions, distributed as follows:

Auburn University	2	Hamilton College	3
Alma College	1	Hampden-Sydney College	1
Amherst College	1	Harpur College SUNY at Binghamton	1
Antioch College	1	Harvard	1
Arizona State University	1	Holy Cross College	2
Augustana College	1	Hobart College	1
		Howard University	1
Bard College	1		
Baylor University	1	Illinois State University	1
Belmont Abbey College	1	Illinois Wesleyan University	1
Beloit College	1	Indiana University	2
Birmingham-Southern College	1	Iowa State College	1
Bishop College	1		
Boston College	3	Johns Hopkins University	5
Boston University	1	Kent State University	1
Bowling Green University	1	Kenyon College	3
Brigham Young University	9	Knox College	1
Brown University	4		
		Lafayette College	1
Calvin	1	Lehigh University	2
Carnegie-Mellon University	1	Louisiana State University	1
Catholic University of America	1		
Central Methodist College	1	Massachusetts Institute of Technology	1
Centre College	2	Middlebury College	2
Clark University	1	Millsaps College	1
Clemson	1	Mississippi State College	2
Coe College	1	Mount Holyoke College	2
Colgate University	4	Mount Union College	1
College of Wooster	1		
Columbia College	1	New York University	1
Cornell University	6	Northwestern University	3
		Notre Dame	4
Dartmouth College	6		
Davidson College	3	Occidental College	3
DePauw University	1	Ohio State University	9
Dickinson College	2	Ohio Wesleyan University	1
Drake University	1	Olivet	1
Drew University	2	Oklahoma State University	1
Duke University	28	Oregon State University	1
Eastern Michigan University	1	Princeton University	2
Emory University	3	Queens College	1
Florida Southern College	1	Roosevelt University	1
Florida State University	3	Rutgers University	1
Franklin & Marshall	2		
		St. Andrews Pres. College	1
George Washington University	1	St. Bonaventure University	1
Georgetown College	1	St. Louis University	2
Georgetown University	2	St. Olaf College	1
Georgia Tech.	1	Stanford University	1
Gettysburg College	2	SUNY at Buffalo	3
Grinnell College	1	Sweetbriar College	1
		Syracuse University	3

Texas Christian	1	University of South Florida	1
Thiel College	1	University of Southern California	1
Trinity College	2	University of Tennessee	1
Trinity University	1	University of Texas	1
Tulane University	2	University of Utah	1
		University of Washington	2
U.S. Air Force Academy	2	University of Western Ontario	1
U.S. Naval Academy	4	University of Wisconsin	1
University of Alabama	2	University of Wyoming	1
U.C.L.A.	3	Utah State University	1
University of Cincinnati	2		
University of Colorado	1	Vanderbilt University	1
University of Connecticut	1	Vassar	1
University of Denver	2		
University of Florida	4	Wabash College	1
University of Georgia	2	Wake Forest University	3
University of Illinois	2	Washington & Jefferson College	1
University of Iowa	1	Washington & Lee University	2
University of Maine	1	Wayne State University	1
University of Maryland	1	Weber State College	1
University of Miami	1	Wellesley	1
University of Michigan	4	Wesleyan University	3
University of Minnesota	1	Western College	1
University of Missouri	1	Westminster College	1
University of Nebraska	1	Whitman College	4
University of New Hampshire	1	Whittier College	1
University of North Carolina	7	Willamette University	2
University of Pennsylvania	1	Wittenberg University	2
University of Redlands	1	Wofford College	1
University of Rochester	1		
University of the South	1	Xavier University	1
University of South Carolina	4	Yale University	7
University of South Dakota	2		

Home States of Duke Law Students Enrolled 1969-70

Alabama	4	Nebraska	1
Arizona	4	New Jersey	15
California	12	New York	35
Colorado	2	North Carolina	38
Connecticut	4	Ohio	23
Delaware	2	Oklahoma	1
District of Columbia	4	Oregon	2
Florida	18	Pennsylvania	16
Georgia	9	Rhode Island	1
Illinois	12	South Carolina	7
Indiana	4	South Dakota	1
Iowa	6	Tennessee	4
Kansas	1	Texas	4
Kentucky	2	Utah	6
Louisiana	3	Virginia	6
Maine	3	Washington	11
Maryland	7	West Virginia	1
Massachusetts	5	Wisconsin	1
Michigan	6	Wyoming	1
Minnesota	3	Hamilton, Ontario	1
Mississippi	3	Brussels, Belgium	1
Missouri	9		
Montana	1	TOTAL STUDENT BODY	300

Duke Law Students 1969-70

ENROLLMENT

*Class of 1970	73
*Class of 1971	90
Class of 1972	137
Total	300

*It should be noted that the second and third year classes are abnormally small because of selective service losses incurred prior to institution of the new "lottery" system.

Register of Students

THIRD YEAR (CLASS OF 1970)

Ahlquist, Stephen I. (U.C.L.A.), Los Alamitos, California
 Alpern, Howard J. (Colgate University), Merrick, New York
 Baer, J. Arthur, III (Middlebury College), St. Louis, Missouri
 Black, Terry R. (Illinois Wesleyan University), Fairfield, Illinois
 Boyd, Tom H. (Florida State), Miami, Florida
 Byrnes, Michael J. (University of Notre Dame), St. Louis, Missouri
 Carlson, Brenda J. (Duke University), Chappaqua, New York
 Carr, Jean E. (Wake Forest University), Alexandria, Virginia
 Cavanaugh, Victor A. (Centre College of Kentucky), Bradenton, Florida
 Clark, Colin M. (University of Utah), Hagerstown, Maryland
 Copeland, Alexander, III (University of South Carolina), Charlotte, North Carolina
 Cunningham, Richard H. G. (Massachusetts Institute of Technology), Stamford, Connecticut
 Dawson, John R. (Northwestern University), St. Louis, Missouri
 Derryberry, Eugene E. (Duke University), Signal Mountain, Tennessee
 Dickinson, Richard J. (University of Michigan), Wilmette, Illinois
 Ditter, Auston A., Jr. (Brigham Young University), Sacramento, California
 Edwards, John M., Jr. (Yale University), Raymond, Georgia
 Eshelman, Rodney L. (Dartmouth College), White Plains, New York
 Ferguson, R. Buck (Whittier College), Bellevue, Washington
 Fetzer, Jack L. (Oklahoma State University), Woodward, Oklahoma
 Frederick, Donald A. (Beloit College), Savanna, Illinois
 Frenzel, James C. (Duke University), Durham, North Carolina
 Glenn, Paul M., Jr. (Florida State University), Tallahassee, Florida
 Gobert, J. Joseph (Cornell University), Jamaica Plain, Massachusetts
 Haase, Glenn R. (Mt. Union College), Toledo, Ohio
 Haffke, E. William (Cornell University), Morgan, Colorado
 Hall, Maurice H. (Millsaps College), Bay Springs, Mississippi
 Hasson, James K., Jr. (Duke University), Knoxville, Tennessee
 Hedrick, Hal C., Jr. (University of Redlands), San Mateo, California
 Hilbig, Keith K. (Princeton University), Brookfield, Wisconsin
 Hough, David B. (Dartmouth College), New York, New York
 Hurt, Jeffrey W. (United States Air Force Academy), Montgomery, Alabama
 Ingoldsby, Thomas M. (Brown University), Washington, D. C.
 Jenks, Maurice L., III (Hamilton College), Wellesley, Massachusetts
 Johnson, Mark D. (Illinois State University), Normal, Illinois
 Krouse, George R., Jr. (Brown University), Lake Ronkonkoma, New York
 Kuehnle, Kenton L. (Augustana College), Waukegan, Illinois
 Lambe, Julie A. (Whitman College), Bothell, Washington
 Lopic, Jeffrey R. (Dartmouth College), Seattle, Washington
 Larson, Albert H., III (DePauw University), South Bend, Indiana

Lawton, Larry D. (University of Wyoming), Laramie, Wyoming
 Leahy, Michael H. (Yale University), Columbus, Ohio
 McCollum, Frank B. W. (Wesleyan University), Springfield, Missouri
 Martin, James M. (University of Southern California), Costa Mesa, California
 Murray, William J. (Boston College), West Springfield, Massachusetts
 Neeley, Charles B., Jr. (University of North Carolina), Bloomfield Hills, Michigan
 Nisula, David J. (University of Minnesota), Chisholm, Minnesota
 Olson, Joseph E. (University of Notre Dame), Whitman AFB, Missouri
 Parker, Daniel, Jr. (Duke University), Arlington, Virginia
 Pearlman, Michael A. (Duke University), Silver Springs, Maryland
 Petterson, N. Drew (Northwestern University), Barrington, Illinois
 Porter, Stephen D. (University of Illinois), Urbana, Illinois
 Reamer, Charles W., III (Ohio University), Athens, Ohio
 Robinson, William (Hampden-Sydney College), Greensboro, North Carolina
 Rowan, James V. (Georgetown University), Brightwaters, New York
 Rudisill, Robert M., Jr. (University of Florida), College Park, Georgia
 Shenkin, Robert J. (University of Michigan), Wynnewood, Pennsylvania
 Socha, Kenneth M. (University of Notre Dame), Brunswick, New Jersey
 Southam, Lynn W. (Brigham Young University), Orem, Utah
 Stevens, William F. (University of North Carolina), Broadway, North Carolina
 Stewart, Frederick B. (Texas Christian University), Franklin, Virginia
 Stokes, Richard F. (Colgate University), Wilmington, Delaware
 Sumner, William E. (Duke University), Gaffney, South Carolina
 Taylor, Carson G. (Amherst College), Providence, Rhode Island
 Thompson, George L. (Bard College), Franklin Square, New York
 Thurston, Roger (Olivet), Washington, D.C.
 Tieger, Joseph H. (Duke University), Washington, D.C.
 Utley, Sue Ellen (Mt. Holyoke College), Cleveland, Ohio
 Walker, John A. (U.S. Naval Academy), Carrboro, North Carolina
 Weaver, Robert F., Jr. (Auburn University), Jacksonville, North Carolina
 Weber, J. Edward (Duke University), Pittsburgh, Pennsylvania
 Wyckoff, David W. (Whitman College), Grandview, Washington
 Zaino, William J. (Boston College), Scotch Plains, New Jersey

SECOND YEAR (CLASS OF 1971)

Abplanalp, Arthur A., Jr. (Davidson College), Charleston, West Virginia
 Anderson, Louis C. (Colgate University), Ft. Lauderdale, Florida
 Baer, Adelle (University of Western Ontario), Hamilton, Ontario, Canada
 Baird, Joseph E. (Brigham Young University), Globe, Arizona
 Ball, John R. (Emory University), Durham, North Carolina
 Barron, John H., Jr. (University of Maryland), New Carrollton, Maryland
 Becky, Sylvia L. (University of Texas), Deer Park, Texas
 Bellis, Douglass D. (Cornell University), Raleigh, North Carolina
 Benson, John Taft (Brigham Young University), Seattle, Washington
 Bidlake, James S. (Ohio State University), Columbus, Ohio
 Bridwell, Robert K. (Westminster College), St. Joseph, Missouri
 Brown, Richard S. (University of Cincinnati), Lockland, Ohio
 Bruggeman, Burton L. (Coe College), International Falls, Minnesota
 Butler, Michael R. (Air Force Academy), Portland, Oregon
 Caldwell, Paul R. (U. S. Naval Academy), Hackensack, New Jersey
 Cherry, Robert M. (Washington & Jefferson College), Wilmerding, Pennsylvania
 Conlon, Michael W. (Catholic University of America), Columbia, South Carolina
 Daucher, Donald (University of Rochester), New York, New York
 DeFrancisco, John A. (Syracuse University), Syracuse, New York
 Dillow, John D. (University of Washington), Seattle, Washington
 Dornbush, Kenneth F. (Kent State University), Steubenville, Ohio
 Durham, Christine (Wellesley), Tempe, Arizona
 Erickson, Randall L. (University of Wisconsin), Tarawa Terrace, North Carolina
 Flanagan, Christopher S. (Cornell University), New York, New York
 Fox, James R. (Duke University), Hickory, North Carolina
 Gelber, Burton M. (Rutgers University), Passaic, New Jersey

Gerken, Robert F. (Syracuse University), Syracuse, New York
 Grant, Merwin D. (Brigham Young University), St. Johns, Arizona
 Halbrook, Rebecca T. (University of Missouri), Lake City, Florida
 Harbin, S. Karla (Duke University), Cayce, South Carolina
 Harris, Thomas A. (Duke University), Greensboro, North Carolina
 Harwood, Richard S. (Dartmouth College), Bloomington, Illinois
 Henabray, William M., Jr. (University of New Hampshire), Abilene, Texas
 Hopkinson, James E. (Northwestern University), Lake Forest, Illinois
 Hourcle, Laurent R. (Boston University), Bridgeport, Connecticut
 Johnson, Mary Joyce (Mississippi State College), Sparta, Tennessee
 Jordan, Adrienne Gayle (Wake Forest University), Wilmington, North Carolina
 Juterbock, Richard E. (Washington & Lee University), Short Hills, New Jersey
 Keith, Alan G. (Gettysburg College), Gettysburg, Pennsylvania
 Kemp, William (Yale), Cincinnati, Ohio
 Kerley, James K. (Arizona State University), Phoenix, Arizona
 Knight, Christopher N. (Yale University), Durham, North Carolina
 Knight, Jack M. (Georgia Tech.), Charlotte, North Carolina
 Larson, Philip C. (Iowa State University), Villisca, Iowa
 Lawson, Leonard J. (St. Bonaventure University), Parlin, New Jersey
 McGinley, Patrick C. (Dickinson College), Verona, Pennsylvania
 Meszoly, Peter T. (Lehigh University), Philadelphia, Pennsylvania
 Miller, H. Todd (S.U.N.Y. at Buffalo), Snyder, New York
 Miller, Norman (Wesleyan University), Atlanta, Georgia
 Mills, Stephen R. (Hobart College), New York, New York
 Morton, Douglas (Wabash College), Logansport, Indiana
 Mueller, Robert C. (University of South Dakota), Sioux City, Iowa
 Mulligan, Michael J. (Boston College), Webster, New York
 Naclerio, Steven (Colgate University), Wantagh, Long Island, New York
 Oberhausen, Lawrence W. (St. Louis University), Pensacola, Florida
 Oechler, Henry, Jr. (Princeton University), New York, New York
 Oppedal, Gregory A. (Drake University), Des Moines, Iowa
 Osborne, Richard A. (Antioch College), Silver Springs, Maryland
 Peppers, Jerry P. (Ohio University), Cleveland, Ohio
 Prentiss, Paul E. (Middlebury College), Hanover, Massachusetts
 Ratliff, Ernest E. (Vanderbilt University), Durham, North Carolina
 Read, Dale W. (Whitman College), Vancouver, Washington
 Rice, Kenneth B. (Willamette University), Seattle, Washington
 Richmond, Gail (University of Michigan), Chicago, Illinois
 Richmond, Michael (Hamilton College), Great Neck, New York
 Ruis, Ronald H., II (Duke University), Durham, North Carolina
 Rydzal, James A. (St. Louis University), Overland Park, Kansas
 Sader, Robert L. (University of Nebraska), Lincoln, Nebraska
 Scarborough, William G. (Dickson College), Doylestown, Pennsylvania
 Schumacher, Ted A. (Ohio University), Columbus, Ohio
 Seibel, Peter R. (Kenyon College), Defiance, Ohio
 Sharratt, Bryan E. (Duke University), Arlington, Virginia
 Shaw, Stanford E. (Brigham Young University), Provo, Utah
 Sigler, David L. (Tulane University), New Orleans, Louisiana
 Sizemore, Frank J. (Duke University), High Point, North Carolina
 Sterba, M. John, Jr. (Cornell University), Palos Verdes, California
 Thomas, Bryan M. (University of South Florida), St. Petersburg, Florida
 Tisdale, Wright, Jr. (St. Andrews Pres. College), Bloomfield Hills, Michigan
 Turner, Paul G. (Wake Forest College), Washington, D. C.
 Varga, S. Gary (Ohio State University), Fayetteville, North Carolina
 Vaughn, Brian D. (Wooster College), Los Angeles, California
 Vaughan, David D. (Mississippi State University), Jackson, Mississippi
 Ward, Frank P., Jr. (Yale University), Lumberton, North Carolina
 Warren, William M., Jr. (Auburn University), Auburn, Alabama
 Wendt, Barry J. (Drew University), Scotch Plains, New Jersey
 Westmoreland, Joseph L. (University of Florida), Jay, Florida
 Witcover, Christine A. (Sweetbriar College), Fort Bragg, North Carolina
 Witmeyer, John J., III (Tulane University), Harahan, Louisiana
 Wuehrmann, David B. (Duke University), Chatham, New Jersey
 Zachman, Thomas F. (Ohio Wesleyan University), Ripley, Ohio

Abney, Benjamin C. (University of South Carolina), Columbia, South Carolina
 Adams, William H. (Utah State University), Minneapolis, Minnesota
 Allton, John D. (Bowling Green University), Millersport, Ohio
 Ballbach, John D. (U.S. Naval Academy), Wilmington, Delaware
 Barbour, Thomas C. (University of Denver), Ovando, Montana
 Barlow, Thomas W. (Wayne State University), Hazel Park, Michigan
 Barth, Andrew (Johns Hopkins University), Washington, D. C.
 Basney, William C. (Indiana University), Cherry Hill, New Jersey
 Bayless, Robert K. (University of Connecticut), Darien, Connecticut
 Bennett, Roberts O. (Harvard), Jacksonville, Florida
 Blake, Ernest L., Jr. (U.S. Naval Academy), South Portland, Maine
 Blue, Neill J. (Duke University), Red Springs, North Carolina
 Bohner, Dale K. (Brown University), Tarawa Terrace, North Carolina
 Bond, Jeffrey A. (Cornell University), Caldwell, New Jersey
 Boyd, Howard M. (Duke University), Gastonia, North Carolina
 Boyd, Robert W. (Alma College), Midland, Michigan
 Breisblatt, Robert B. (Florida State), Miami Beach, Florida
 Bronis, Stephen J. (University of Florida), Miami, Florida
 Brousseau, Robert T. (Georgetown University), Biloxi, Mississippi
 Brown, Gregory S. (Brigham Young University), Provo, Utah
 Brown, Luke N. III (University of South Carolina), Ridgeland, South Carolina
 Cameron, Don N. (Ohio University), Cleveland Heights, Ohio
 Carr, William P. (University of Georgia), Thomasville, Georgia
 Christensen, Larry E. (University of South Dakota), Hurley, South Dakota
 Christie, Robert J. (University of Michigan), McConnelsville, Ohio
 Christofferson, David T. (Brigham Young University), Orem, Utah
 Clark, Bernard B., Jr. (University of South Carolina), Hampton, South Carolina
 Claxton, Joseph E. (Emory University), McDonough, Georgia
 Cooper, George J. (Williamette University), Atherton, California
 Davidson, Bruce A. (Occidental College), Coronado, California
 Deily, William E. (Drew University), Slingerlands, New York
 Dorsey, Hugh M., III (University of North Carolina), Atlanta, Georgia
 Dozier, June M. (University of Alabama), Gadsden, Alabama
 Ebron, James H. (Duke University), Washington, North Carolina
 Eller, James R., Jr. (Columbia College), Charlotte, North Carolina
 Englar, John D. (Duke University), Reisterstown, Maryland
 Erickson, Paul B. (St. Olaf College), Council Bluffs, Iowa
 Feige, Hans C. (Clemson), Fort Lauderdale, Florida
 Frank, Ronald W. (Carnegie-Mellon University), Cheswick, Pennsylvania
 Gallis, Paul E. (Davidson College), Athens, Georgia
 Galloway, William J., III (Louisiana State University—New Orleans), Metairie, Louisiana
 Ganz, Charles D. (Franklin & Marshall), Malverne, New York
 Garton, Jeffrey P. (Gettysburg College), Chalfont, Pennsylvania
 Gilbride, Mary H. (Trinity College), New York, New York
 Gladstone, Robert M. (Kenyon College), Scarborough, New York
 Gold, Jeffrey L. (New York University), Margate, New Jersey
 Gottlieb, Paul A. (Duke University), Levittown, Pennsylvania
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 Hughes, William V. (Johns Hopkins University), Muncie, Indiana
 Jackson, Donald H. (Clark University), E. Weymouth, Massachusetts
 Janke, Ronald R. (Wittenberg University), Lima, Ohio
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 King, Franklin W. (University of Alabama), Huntsville, Alabama

Klatte, Edward D. (Georgetown College), Richmond, Kentucky
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 LaSonde, Jack (Bishop College), New York, New York
 Lauren, Jeffrey A. (Johns Hopkins University), Great Neck, New York
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 Lewis, L. Burke (Kenyon College), Orlando, Florida
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 Liss, David G. (University of Notre Dame), Folsom, Pennsylvania
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 Lumer, Joel V. (Harpur College S.U.N.Y. at Binghamton), Bronx, New York
 McAlister, James S. (Oregon State University), Corvallis, Oregon
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East Campus

- | | |
|---------------------------|------------------------|
| A Baldwin Auditorium | O Pegram House |
| B Bassett House | P Duke Press |
| C Brown House | Q Infirmary |
| D Union Building | R Ark |
| E Faculty Apartments | S Crowell Building |
| F Art Museum, Geology | T Epworth Inn |
| G Aycock House | U Gilbert-Addams House |
| H East Duke Building | V Southgate Hall |
| I West Duke Building | W Campus Center |
| J Jarvis House | X Woman's College |
| K Carr Building | Y Asbury Building |
| L Giles House | Z Bivins Building |
| M Woman's College Library | AA Art Building |
| N Alspaugh House | BB Branson Building |



West Campus

- | | | | |
|--------------------------|--------------------------|----------------------|--|
| A Duke Chapel | H Hospital Main Entrance | O Craven Quadrangle | V Card Gymnasium |
| B Divinity School | I Gerontology, D & T, | P Wannamaker Hall | W Indoor Stadium |
| C Gray Building | J Clinical Research | Q Crowell Quadrangle | X School of Law |
| D Perkins Library | K Duke Hospital | R Clock Tower Court | Y Gross Chemistry |
| E Language Center | L Sociology, Psychology | S Kilgo Quadrangle | Z Biological Sciences |
| F Old Chemistry Building | M Social Sciences | T Union Building | AA Plant Environmental |
| G Davison Building | N Allen Building | U Flowers Building | BB Physics Building |
| School of Medicine | O Few Quadrangle | Page Auditorium | CC Nuclear Laboratory |
| | | | DD School of Engineering |
| | | | EE Army Research |
| | | | FF Medical Center |
| | | | GG Nanaline Hall |
| | | | HH Warehouse |
| | | | II Bell Building |
| | | | JJ Hanes House |
| | | | KK School of Nursing |
| | | | LL Hanes House |
| | | | MM Graduate Center |
| | | | NN Alumni House |
| | | | OO Commonwealth |
| | | | PP Personnel Office |
| | | | QQ International |
| | | | RR Personnel Office |
| | | | SS Education Program |
| | | | TT A Better Chance |
| | | | UU International Center |
| | | | VV Campus Store |
| | | | WW Office of Institutional Advancement |
| | | | XX Information Services Bureau |
| | | | YY Admissions Office |
| | | | ZZ Edens Quadrangle |
| | | | ZZ Wade Stadium |



BULLETIN OF DUKE UNIVERSITY

School of Medicine and
Medical Center
1970



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- For *Bulletin of Faculty Publications*, apply to the Office of the Vice Provost, for Academic Administration, Duke University, Durham, N. C. 27706
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Medical School Calendar

First Year Students

1970

September

- 8 Tuesday—Registration, orientation and first day of academic year, 1970-71
- 9 Wednesday—Examination day
- 10 Thursday—Begin classes, Term 1

November

- 26 Thursday—Thanksgiving holiday
- 30 Monday—Classes resume

December

- 18 Friday—Begin Christmas holiday

1971

January

- 4 Monday—Classes resume
- 29 Friday—End Term 1

February

- 1 Monday—Begin Term 2

March

- 10 Wednesday—Registration for Summer Term, 1971, and Terms 1, 2, 3, 4, 5, 1971-72 (Second Year Clinical Science Core Rotations)

April

- 10 Saturday—Begin spring vacation
- 19 Monday—Classes resume

May

20 Thursday—Examination Day

June

11 Friday—End Term 2

22 Tuesday—National Boards Part I

23 Wednesday—National Boards Part I

28 Monday—Begin optional Summer Term, 1971 (Clinical Core Rotations)

July

5 Monday—Independence Day holiday

August

13 Friday—End optional Summer Term

Second Year Students

1970

September

8 Tuesday—First day of academic year, 1970-71. Begin Emergency and Disaster Surgery Course

15 Tuesday—Begin Term 1 (Clinical Core Rotations)

October

30 Friday—End Term 1

November

2 Monday—Begin Term 2

26 Thursday—Thanksgiving holiday

December

18 Friday—End Term 2. Begin Christmas holiday

1971

January

4 Monday—Begin Term 3

February

19 Friday—End Term 3

22 Monday—Begin Term 4

March

24 Wednesday—Registration for Summer Term, 1971 and Terms 1, 2, 3, 4, 1971-72 (Third Year Elective Program)

April

- 2 Friday—End Term 4. Begin spring vacation
- 12 Monday—Begin Term 5
- 14–15 Wednesday–Thursday—Preregistration for Graduate School fall semester, 1971

May

- 20 Thursday—Examination day
- 28 Friday—End Term 5
- 31 Monday—Begin optional Summer Term, 1971. (Third Year Elective Program)

July

- 5 Monday—Independence Day holiday
- 30 Friday—End optional Summer Term

Third Year Students

1970

September

- 8 Tuesday—First day of academic year 1970-71. Begin Term 1
- 17–19 Thursday–Saturday—Registration for Graduate School fall semester, 1970

November

- 13 Friday—End Term 1
- 16 Monday—Begin Term 2
- 18–19 Wednesday–Thursday—Preregistration for Graduate School spring semester, 1971
- 26 Thursday—Thanksgiving holiday
- 27 Friday—Classes resume

December

- 19 Saturday—Begin Christmas holiday

1971

January

- 4 Monday—Classes resume

February

- 5 Friday—End Term 2
- 4–6 Thursday–Saturday—Registration for Graduate School spring semester, 1971
- 8 Monday—Begin Term 3

March

- 24 Wednesday—Registration for Summer Term, 1971, and Terms 1, 2, 3, 4, 1971-72 (Fourth Year Elective Program)
- 31 Wednesday—End Term 3. Begin spring vacation

April

- 5 Monday—Classes resume. Begin Term 4
- 14-15 Wednesday-Thursday—Preregistration for Graduate School fall semester, 1971

May

- 20 Thursday—Examination Day

June

- 4 Friday—End Term 4
- 7 Monday—Begin optional Summer Term, 1971 (Fourth Year Elective Program)

July

- 5 Monday—Independence Day holiday

August

- 6 Friday—End optional Summer Term

Fourth Year Students

1970

September

- 8 Tuesday—First day of academic year 1970-71. Begin Term 1
- 17-19 Thursday-Saturday—Registration for Graduate School fall semester, 1970

November

- 13 Friday—End Term 1
- 16 Monday—Begin Term 2
- 18-19 Wednesday-Thursday—Preregistration for Graduate School spring semester, 1971
- 26 Thursday—Thanksgiving holiday
- 27 Friday—Classes resume

December

- 19 Saturday—Begin Christmas holiday

1971

January

- 4 Monday—Classes resume

February

- 5 Friday—End Term 2
- 4-6 Thursday-Saturday—Registration for Graduate School spring semester, 1971
- 8 Monday—Begin Term 3

March

- 31 Wednesday—End Term 3. Begin spring vacation

April

- 5 Monday—Classes resume. Begin Term 4

May

- 20 Thursday—Examination Day

June

- 4 Friday—End Term 4
- 6 Sunday—Commencement Sermon and Hippocratic Oath Ceremony
- 7 Monday—Graduating Exercises



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Ralph Hawkins, *Business Manager, Medical Division*

H. D. Maynard, *Assistant Business Manager, Surgical Division*

Patrick L. Powell, *Assistant Business Manager, Medical Division*

Internships and Residencies

Straight internships of one year duration are available in Medicine, Surgery, Pathology, and Pediatrics, and two mixed internships are offered in Obstetrics and Pediatrics. Appointments are from July 1 through June 30 with few exceptions. Interns receive a stipend, professional liability insurance, uniforms, and laundry of uniforms provided.

The residencies offered, with the chairman or chief of each service are as follows:

Anesthesiology	(Chm.)	Sara J. Dent, M.D.
Internal Medicine	(Chm.)	James B. Wyngaarden, M.D.
Dermatology		J. Lamar Callaway, M.D.
Neurology		Stanley H. Appel, M.D.

Obstetrics and Gynecology .. (Chm.)	Roy T. Parker, M.D.
Ophthalmology (Chm.)	Joseph A. C. Wadsworth, M.D.
Pathology (Chm.)	Thomas D. Kinney, M.D.
Pediatrics (Chm.)	Samuel Katz, M.D.
Pediatric Allergy	Susan C. Dees, M.D.
Pediatric Cardiology	Madison S. Spach, M.D.
Psychiatry (Chm.)	Ewald W. Busse, M.D.
Radiology (Chm.)	Richard G. Lester, M.D.
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General Surgery	William G. Shingleton, M.D.
Neurosurgery	Guy L. Odom, M.D.
Oral Surgery	Nicholas G. Georgiade, M.D.
Orthopaedic Surgery	J. Leonard Goldner, M.D.
Otolaryngology	William R. Hudson, M.D.
Plastic Surgery	Kenneth L. Pickrell, M.D.
Thoracic Surgery	Will C. Sealy, M.D.
Urologic Surgery	James F. Glenn, M.D.

Application forms and information for internships, residencies, or fellowships may be obtained by writing to the chairman of the appropriate department, Duke University Medical Center, Durham, North Carolina. Both men and women graduates of any Class A Medical School are eligible for appointment. While internships are rarely available to graduates of medical schools outside the United States and Canada, a limited number of residencies and research fellowships are available from time to time in which case certification by E.C.F.M.G. (Educational Council on Foreign Medical Graduates, 1710 Orrington Avenue, Evanston, Illinois) is prerequisite.

Duke University Medical Center is a participating member of the National Intern Matching Program, 2530 North Ridge Avenue, Evanston, Illinois, and all applicants must register with this program. The Hospital is a member of the American Hospital Association, is approved by the American Medical Association for internship and residency training, and is fully approved by the Joint Commission on Accreditation of Hospitals.

As the Duke University Medical Center is an integral part of Duke University, its educational, recreational, and athletic facilities are available for the resident staff.

The Durham Veterans Administration Hospital adjoins the Duke University Campus, and is operated under the supervision of the Dean's Committee of the Duke University School of Medicine. The full time professional staff of the V. A. Hospital are all members of the School of Medicine faculty. All training programs are integrated with corresponding programs at Duke University Medical Center, which includes rotating of house officers to each hospital from time to time.

All applicants will be considered without regard to race, color, religion, sex, or national origin.

Continuing Education

Professor W. J. DeMaria, *Assistant Dean, Continuing Education*; Professor W. Nicholson, *Assistant Dean Emeritus, Continuing Education*

Throughout the entire year there are many formal courses of postgraduate instruction. These include subjects for the generalist as well as for the various specialists. Announcements concerning these symposia will be made from time to time. In addition, there are numerous regular specialty conferences in all clinical departments which graduates in medicine are welcome to attend.



Medical Center Faculty and Staff

- Richard G. Absher, B.S. (New Mexico, 1962), *Research Associate in Surgery*
- Trogler Francis Adkins, M.D. (Duke, 1936), *Clinical Instructor of Obstetrics and Gynecology*
- Sam A. Agnello, A.B. (Duke, 1939), *Director of the Division of Audio-visual Education*
- Paul W. Aitken, B.D. (Duke, 1955), Th.M. (Duke, 1961), *Duke Hospital Chaplain*
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Jack K. Goodrich, M.D. (Tennessee, 1953), *Associate Professor of Radiology and Director, Division of Nuclear Medicine*

- Jeffrey H. Gordon, M.D. (Cornell, 1965), *Instructor in Medicine*
- John Ashley Goree, M.D. (Duke, 1955), *Associate Professor of Radiology and Associate in Anatomy*
- Ralph J. Gorten, M.D. (Pennsylvania, 1955), *Assistant Professor of Medicine and Radiology*
- Linda Gottsch, M.D. (Univ. of Buffalo), *Research Associate in Urology*
- Alice JoAnne Graham, A.D.A. (Hines Veterans Administration Hospital, 1960), *Instructor in Dietetics*
- Thomas P. Graham, M.D. (Duke, 1963), *Assistant Professor of Pediatrics*
- William Alexander Graham, M.D. (Pennsylvania, 1932), *Clinical Instructor in Obstetrics and Gynecology*
- Cyrus L. Gray, M.D. (Duke, 1937), *Clinical Associate in Radiology, High Point, N.C.*
- Frederick Q. Graybeal, M.D. (Duke, 1965), *Assistant Professor of Pathology and Assistant Director of Clinical Laboratories*
- Robert L. Green, Jr., M.D. (Hahnemann, 1946), *Associate Professor of Psychiatry*
- Ronald C. Greene, Ph.D. (California Inst. of Tech, 1954), *Assistant Professor of Biochemistry and Principal Scientist, V. A. Hospital, Durham, N.C.*
- Joseph C. Greenfield, M.D. (Emory, 1956), *Associate Professor of Medicine and Assistant Professor of Physiology*
- Robert A. Gregg, M.D. (Med. Coll. of South Carolina, 1948), *Associate Professor of Physical Medicine and Coordinator of Rehabilitation*
- John F. Griffith, M.D. (Univ. of Saskatchewan, 1958), *Assistant Professor of Pediatrics and Medicine*
- John H. Grimes, M.D. (Northwestern, 1965), *Instructor in Urologic Surgery*
- Keith S. Grimson, M.D. (Rush Med. Coll., 1933), *Professor of Surgery*
- Harvey E. Grode, M.D. (Duke, 1960), *Clinical Associate in Medicine, Durham, N.C.*
- Samson R. Gross, Ph.D. (Columbia, 1953), *Professor of Genetics*
- Cesar Guajardo, M.D. (1961, Universidad de Nuevo Leon), *Instructor in Psychiatry*
- Walter R. Guild, Ph.D. (Yale, 1951), *Professor of Biophysics and Director, Medical Research Training Program*
- John Gutknecht, Ph.D. (North Carolina, 1963), *Assistant Professor of Physiology*
- J. Caulie Gunnells, M.D. (South Carolina, 1956), *Associate Professor of Medicine*
- Robert L. Habig, Ph.D. (Purdue, 1966), *Associate in Biochemistry and Acting Director, Clinical Chemistry Laboratory*
- Donald B. Hackel, M.D. (Harvard, 1946), *Professor of Pathology*
- Mary P. Haigler, C.R.N.A., *Assistant Nurse Anesthetist*

- Thomas M. Haizlip, M.D. (North Carolina, 1958), *Instructor in Psychiatry*
- Dwight H. Hall, Ph.D. (Purdue, 1967), *Assistant Professor of Biochemistry*
- Kenneth D. Hall, M.D. (Duke, 1953), *Professor of Anesthesiology*
- Patricia D. Hall, M.S.W. (North Carolina, 1967), *Instructor in Psychiatric Social Work*
- Joseph F. Hallal, M.D. (Pennsylvania, 1966), *Instructor in Medicine*
- Gerald M. Halprin, M.D. (Wayne State, 1962), *Instructor in Medicine*
- J. Richard Hamer, M.A. (Magdalene, Cambridge, 1947), *Administrative Director, Department of Anatomy*
- Charles B. Hammond, M.D. (Duke, 1961), *Assistant Professor in Obstetrics and Gynecology*
- William Edward Hammond, Ph.D. (Duke, 1967), *Assistant Professor of Community Health Sciences and Biomedical Engineering*
- *Philip Handler, Ph.D. (Illinois, 1939), *James B. Duke Professor of Biochemistry*
- Oscar C. E. Hansen-Pruss, M.D. (Johns Hopkins, 1924), *Professor of Medicine*
- Kenneth C. Hanson, M.D. (Columbia, 1960), *Instructor in Medicine*
- Elizabeth B. Harkins, M.S.W. (Pittsburgh, 1938), *Associate in Psychiatric Social Work, Staff, Highland Hospital, Asheville, N.C.*
- Thomas S. Harle, M.D. (Northwestern, 1957), *Associate Professor of Radiology*
- Philip Darling Harriman, Ph.D. (California, 1964), *Assistant Professor of Biochemistry*
- Cecil Craig Harris, M.S. (Tennessee, 1951), *Assistant Professor of Medical Electronics*
- George P. Harris, A.B. (Duke, 1926), *Field Director, Hospital and Orphan Sections, The Duke Endowment, and Clinical Instructor in Hospital Administration*
- Harold J. Harris, M.D. (Long Island Coll. of Med., 1949), *Assistant Professor of Pediatrics and Associate Professor of Psychiatry*
- Jerome S. Harris, M.D. (Harvard, 1933), *J. Buren Sidbury Professor of Pediatrics and Associate Professor of Biochemistry*
- Martha W. Harris, M.T. (ASCP), *Instructor in Medical Technology*
- Richard W. Harris, M.S. (L.S.) (North Carolina, 1965), *Acquisitions Librarian*
- Reginald T. Harris, M.D. (Tennessee, 1955), *Instructor in Medicine*
- Claude Harrison, M.S. (North Carolina Coll., 1964), *Instructor in Medical Technology*
- Frederica C. Harrison, M.S.W. (Atlanta, 1962), *Instructor in Psychiatric Social Work*

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- Deryl Hart, M.D. (Johns Hopkins, 1921), *Professor Emeritus of Surgery and President Emeritus of Duke University*
- Ralph Hawkins, B.S. (North Carolina, 1957), *Assistant Business Manager, Medical Division, Private Diagnostic Clinic*
- Claude J. Hearn, D.M.D. (New Jersey Coll. of Dentistry, 1967), *Instructor in Oral Surgery*
- Eleanor deG. Heath, M.S.W. (North Carolina, 1967), *Instructor in Psychiatric Social Work*
- Hans M. C. Heick, Ph.D. (Western Ontario, 1964), *Instructor in Pediatrics*
- Peter L. Hein, Jr., M.D. (George Washington, 1955), *Associate Professor of Psychiatry*
- James P. Hendrix, M.D. (Pennsylvania, 1930), *Professor of Medicine*
- Betty Sue Hensley, A.D.A. (Duke, 1966), *Medical Dietitian*
- Stephen Hersey, Ph.D. (Duke, 1968), *Assistant Professor of Physiology*
- Thomas T. Hetherington, M.D. (Pennsylvania, 1961), *Associate in Radiology*
- Siegfried Heyden, M.D. (Univ. of Berlin, 1951), *Associate Professor of Community Health Sciences*
- Albert Heyman, M.D. (Maryland, 1940), *Professor of Neurology and Chief of the Division*
- Dorothy K. Heyman, M.S.W. (Pennsylvania, 1940), *Assistant in Psychiatric Social Work*
- Jacqueline Hijmans, M.D. (State Univ. of Leyden, 1951), *Instructor in Physiology and Associate in Medicine*
- Gale B. Hill, Ph.D. (Duke, 1966), *Associate in Radiology and Research Associate in Microbiology*
- Robert L. Hill, Ph.D. (Kansas, 1954), *Professor of Biochemistry and Chairman of the Department of Biochemistry*
- Brian A. Hills, Ph.D. (Adelaide Univ., 1966), *Associate Professor of Experimental Surgery and Associate Professor of Biomedical Engineering*
- Frederick R. Hine, M.D. (Yale, 1949), *Associate Professor of Psychiatry*
- Seth G. Hobart, Jr., M.D. (Duke, 1959), *Clinical Instructor in Otolaryngology, Durham, N.C.*
- John P. Hogan, M.D. (Northwestern, 1962), *Instructor in Plastic and Maxillofacial Surgery*
- Leslie B. Hohman, M.D. (Johns Hopkins, 1917), *Professor Emeritus of Psychiatry, Consultant in Psychiatry; and Assistant Professor of Pediatrics*
- Warren F. Holland, M.D. (Duke, 1963), *Instructor in Medicine*
- William F. Hollister, M.D. (Duke, 1938), *Assistant Clinical Professor of Surgery, Pinehurst Surgical Clinic, Pinehurst, N.C.*
- Kenneth M. Holt, M.B.A. (George Wash. Univ., 1964), *Assistant Director, Duke Hospital*

Bobbie Holtzman, B.S., R.T. (William and Mary, 1965), *Assistant Director, School of Radiologic Technology*
 Doris Honeycutt, A.D.A. (Duke, 1966), *Medical Dietitian*
 Grace C. Horton, B.S. (Albright College, 1950), *Associate in Physical Therapy*
 D. Robert Howard, M.D. (Wisconsin, 1962), *Assistant Professor of Community Health Sciences*
 Raymond L. Howard, *Instructor in Medical Photography*
 Thomas R. Howerton, A.B. (Duke, 1946), *Clinical Preceptor in Hospital Administration and Administrator, Wilson Memorial Hospital, Wilson, N.C.*
 Andrew T. Huang, M.D. (Taiwan, 1963), *Instructor in Medicine*
 William R. Hudson, M.D. (Bowman Gray, 1951), *Professor of Otolaryngology and Chief of the Division*
 Thomas A. Huff, M.D. (Emory, 1961), *Associate in Medicine*
 Jack Hughes, M.D. (Pennsylvania, 1943), *Clinical Instructor in Urology, Durham, N.C.*
 Mary M. Huse, Ph.D. (Duke, 1959), *Assistant Professor of Medical Psychology and Lecturer in Psychology*
 William B. Inabnet, M.D. (Louisiana State, 1958), *Clinical Instructor in Surgery*
 Pedro J. Irigaray, M.D. (Mexico, 1955), *Assistant Clinical Professor of Psychiatry*
 Virginia Irons, M.S. (Virginia Polytech. Instit., 1960), *Senior Research Dietitian*
 Ryotaro Ishizaki, Ph.D. (Univ. of Tokyo, 1962), *Research Associate in Experimental Surgery*
 Akira Itoh, M.D. (Kyushu Univ., 1962), *Instructor in Medicine*
 Jacquelyne F. Ivey, C.R.N.A., *Assistant Nurse Anesthetist*
 Alice N. Jackson, M.S.W. (Western Reserve, 1954), *Instructor in Psychiatric Social Work, Staff, Highland Hospital, Asheville, N.C.*
 Jacquelyne J. Jackson, Ph.D. (Ohio State, 1960), *Assistant Professor of Medical Sociology and Research Fellow in Aging and Human Development*
 Ann M. Jacobansky, R.N., M.Ed. (Pittsburgh, 1953), *Professor of Nursing*
 Miriam J. Jacobs, Ph.D. (Alabama, 1966), *Assistant Professor of Anatomy and Chairman of the Department of Physical Therapy and Professor of Physical Therapy*
 M. M. Jarmakani, M.D. (Damascus Univ., 1962), *Assistant Professor of Pediatrics*
 Frances C. Jeffers, M.A. (Columbia, 1945), *Research Associate in Psychiatry*
 Patricia Swogger Jennings, B.S. (Michigan State, 1955), *Teaching Dietitian*
 Paul H. Jewett, M.D. (Stanford, 1962), *Associate in Pediatrics*

- John P. Jimenez, M.D. (Med. Coll. of Virginia, 1955), *Assistant Professor of Radiology*
- Frans F. Jobsis, Ph.D. (Michigan, 1958), *Professor of Physiology*
- Amos N. Johnson, M.D. (Pennsylvania, 1933), *Clinical Instructor in General Practice*
- Charles Johnson, M.D. (Howard, 1963), *Clinical Associate in Medicine*
- Dale T. Johnson, Ph.D. (Vanderbilt, 1966), *Assistant Professor of Medical Psychology, Staff, Highland Hospital, Asheville, N.C.*
- Edward A. Johnson, M.B., Ch.B. (Univ. of Sheffield, 1950), M.D. (Univ. of Sheffield, 1953), *Professor of Pharmacology*
- Helen G. Johnson, M.S.W. (Pittsburgh, 1946), *Instructor in Psychiatric Social Work, Staff, Highland Hospital, Asheville, N.C.*
- Rachel R. Johnson, C.R.N.A., *Assistant Nurse Anesthetist*
- Raleigh F. Johnson, Jr., Ph.D. (Purdue, 1969), *Associate in Radiology*
- Irwin Johnsrude, M.D. (Manitoba, 1956), *Associate Professor of Radiology*
- William W. Johnston, M.D. (Duke, 1959), *Assistant Professor of Pathology and Director, School of Cytotechnology*
- Wolfgang Karl Joklik, Ph.D. (Oxford, 1952), *Professor of Microbiology and Immunology and Chairman of the Department*
- Claudius Parks Jones, M.T. (Duke, 1935), *Research Associate in Obstetrics and Gynecology*
- James David Jones, M.D. (Duke, 1954), *Associate in Pediatrics and Assistant Professor of Psychiatry*
- Thomas T. Jones, M.D. (Johns Hopkins, 1932), *Clinical Instructor in General Practice and Clinical Associate in Medicine, Durham, N.C.*
- Jayant G. Joshi, Ph.D. (Univ. of Poona, India, 1957), *Assistant Professor of Biochemistry*
- Varda Kahn, Ph.D. (Illinois, 1959), *Research Associate in Physiology*
- Helen L. Kaiser, P.T. (Harvard, 1921), *Professor of Physical Therapy*
- Henry Kamin, Ph.D. (Duke, 1948), *Professor of Biochemistry*
- Mogens Kampp, M.D. (Univ. of Copenhagen, 1964), *Research Associate in Pharmacology*
- Shankar N. Kapoor, M.D. (King George's Med. Coll., Lucknow, India, 1935), *Clinical Associate in Orthopaedics, Durham, N.C.*
- Samuel Lawrence Katz, M.D. (Harvard, 1952), *Professor of Pediatrics and Chairman of the Department*
- Bernard Kaufman, Ph.D. (Indiana, 1961), *Associate Professor of Biochemistry*
- Louise Kaufman, A.B. (North Carolina, 1947), *Research Associate in Obstetrics and Gynecology*
- Charles R. Keith, M.D. (Kansas, 1957), Ph.D. (Harvard, 1961), *Assistant Professor of Psychiatry*
- William N. Kelley, M.D. (Emory, 1963), *Assistant Professor of Medicine and Assistant Professor of Biochemistry*

Harry B. Kelso, M.D. (Texas, 1965), *Instructor in Medicine*
 Walter Kempner, M.D. (Heidelberg, 1927), *Professor of Medicine*
 Patrick Kenan, M.D. (Duke, 1959), *Assistant Professor of Otolaryngology*
 Eugene M. Kendall, M.D. (Duke, 1967), *Instructor in Medicine*
 Grace P. Kerby, M.D. (Duke, 1946), *Professor of Medicine*
 Betty W. Kernodle, R.R. L., A.B. (Duke, 1940), *Director, Medical Record Department*
 Thomas C. Kerns, Jr., M.D. (Duke, 1950), *Clinical Assistant in Ophthalmology*
 Roby M. Kerr, M.S.W. (Tulane, 1962), *Associate in Psychiatric Social Work*
 Kaye H. Kilburn, M.D. (Utah, 1954), *Associate Professor of Medicine and Assistant Professor of Anatomy*
 Burton B. King, M.A. (Northwestern, 1955), *Associate in Audiology*
 Glendall L. King, M.D. (Washington Univ., 1955), *Clinical Lecturer in Surgery*
 John T. King, M.D. (Med. Coll. of Virginia, 1945), *Assistant Clinical Professor of Pediatrics*
 Terry D. King, M.D. (Univ. of Texas, 1962), *Associate in Pediatrics*
 Thomas D. Kinney, M.D. (Duke, 1937), *R. J. Reynolds Tobacco Company Professor of Medical Education; Professor of Pathology; and Chairman of the Department of Pathology and Director of Medical Education*
 Thomas J. Kinney, M.D. (Georgetown Univ., 1963), *Instructor in Medicine*
 Marcel Kinsbourne, B.M. (Guy's Hospital, London, 1955), *Associate Professor of Pediatrics and Associate Professor of Neurology*
 Gary Kirk, Ph.D. (Yale, 1968), *Research Associate in Physiology*
 Norman Kirshner, Ph.D. (Pennsylvania State, 1952), *Associate Professor of Biochemistry*
 Paul M. Kirwin, Ph.D. (Univ. of Texas, 1968), *Associate in Medical Psychology*
 William J. Klein, Jr., M.D. (Columbia Univ., 1962), *Associate in Medicine*
 Gordon K. Klintworth, M.D., Ph.D. (Univ. of Witwatersrand, 1957, 1966), *Associate Professor of Pathology and Research Associate in Ophthalmology*
 Conrad M. Knight, B.S. (Norwich, 1953), *Radiological Safety Officer; Associate in Radiology; and Associate in Community Health Sciences*
 Delmar H. Knudson, M.D. (Temple Univ., 1960), *Associate in Radiology*
 Stuart Knutton, Ph.D. (Birmingham, England, 1969), *Research Associate in Anatomy*
 Yihong Kong, M.D. (Taiwan, 1958), *Assistant Professor of Medicine*

- Helen T. Kotin, M.D. (Colorado, 1938), *Assistant to the Vice President—Research Coordination; Associate in Community Health Sciences*
- Paul Kotin, M.D. (Illinois, 1940), *Clinical Professor of Pathology*
- John C. Kouns, D.D.S. (Emory, 1937), *Clinical Associate in Dentistry and Chief of Dental Service, V. A. Hospital, Durham, N.C.*
- George E. Koury, M.D. (Tulane, 1944), *Clinical Associate in Medicine, Burlington, N.C.*
- Nicholas M. Kredich, M.D. (Michigan, 1962), *Assistant Professor of Medicine and Assistant Professor of Biochemistry*
- Irwin Kermen, Ph.D. (Harvard, 1961), *Assistant Professor of Medical Psychology and Assistant Professor of Psychology*
- William B. Kremer, M.D. (State Univ. of New York, 1960), *Assistant Professor of Medicine*
- Martin J. Kreshon, M.D. (Marquette Univ., 1954), *Clinical Instructor in Ophthalmology*
- Ronald P. Krueger, M.D. (Duke, 1965), *Associate in Pediatrics*
- Arnold D. Krugman, Ph.D. (Kentucky, 1952), *Associate Professor of Medical Psychology and Lecturer in Psychology*
- Raymond J. Kusiak, M.D. (Virginia, 1965), *Instructor in Otolaryngology*
- Johannes A. Kylstra, M.D. (Leiden, 1952), Ph.D. (Leiden, 1958), *Associate Professor of Medicine and Assistant Professor of Physiology*
- Maurine B. LaBarre, M.S.W. (Bryn Mawr, 1934), *Assistant Professor of Psychiatric Social Work*
- Weston LaBarre, Ph.D. (Yale, 1937), *Consultant in Psychiatry and Professor of Anthropology*
- Peregrina C. Labay, M.D. (Univ. of St. Thomas, 1954), *Assistant Professor of Urology*
- Leon Lack, Ph.D. (Columbia, 1953), *Associate Professor of Pharmacology*
- Martin Lakin, Ph.D. (Chicago, 1955), *Professor of Medical Psychology and Professor of Psychology*
- Maurice B. Landers, III, M.D. (Univ. of Michigan, 1963), *Assistant Professor of Ophthalmology*
- David J. Lang, M.D. (Harvard, 1958), *Associate Professor of Pediatrics*
- Alphonse J. Langlois, Ph.D. (Duke, 1966), *Research Associate in Surgery*
- John E. Larsh, Jr., Sc.D. (Johns Hopkins, 1943), *Clinical Professor of Parasitology, Duke University, and Professor of Parasitology, University of North Carolina*
- John Laszlo, M.D. (Harvard, 1955), *Associate Professor of Medicine*
- Alexander B. Latty, M.D. (Harvard, 1967), *Instructor in Medicine*
- Peter K. Lauf, M.D. (Freiburg, 1960), *Assistant Professor of Physiology*
- Patricia Lawrence, R.N., M.A. (Columbia Teachers Coll., 1960), *Assistant Professor of Nursing*
- Glenn A. Lazenby, D.D.S. (Med. Coll. of Virginia, 1946), *Clinical Instructor in Oral Surgery*

- Harold E. Lebovitz, M.D. (Pittsburgh, 1956), *Associate Professor of Medicine and Director of Endocrinology and Assistant Professor of Physiology*
- John C. LeMay, D.V.M. (Georgia, 1959), *Associate Professor of Veterinary Medicine and Chairman of the Department*
- Lawrence S. Lessin, M.D. (Chicago, 1962), *Associate in Medicine*
- Norma Lester, B.A. (Lecs McRae, 1954), M.T. (ASCP), *Instructor in Medical Technology*
- Richard G. Lester, M.D. (Columbia, 1948), *Professor of Radiology and Chairman of the Department*
- Donald S. Leventhal, Ph.D. (Purdue, 1965), *Assistant Professor of Medical Psychology and Associate in Pediatrics*
- Miriam L. Leventhal, M.S.W. (New York School of Social Work, 1963), *Instructor in Psychiatric Social Work*
- David E. Lewis, M.A. (Northern Michigan, 1968), *Associate in Community Health Sciences*
- Melvin Licberman, Ph.D. (New York, 1964), *Assistant Professor of Physiology and Pharmacology*
- Veronica R. Liederman, A.M. (Radcliffe, 1961), *Instructor in Medical Sociology*
- Anthony R. Limbrick, Ph.D. (Birmingham, England, 1968), *Research Associate in Anatomy*
- Marie A. Linder, Ph.D. (Duke, 1966), *Instructor in Medical Psychology*
- Charles E. Llewellyn, Jr., M.D. (Med. Coll. of Virginia, 1946), *Associate Professor of Psychiatry*
- Ronald A. Lochbaum, C.P.A., B.S. (West Virginia, 1953), *Controller*
- David A. Lockhart, M.D. (Duke, 1951), *Clinical Instructor in Pediatrics*
- Gerald L. Logue, M.D. (Univ. of Pittsburgh, 1966), *Instructor in Medicine*
- Arthur Hill London, M.D. (Pennsylvania, 1927), *Clinical Professor of Pediatrics, Duke University, and Clinical Professor of Pediatrics, University of North Carolina*
- William L. London, M.D. (North Carolina, 1955), *Associate Clinical Professor of Pediatrics*
- E. Croft Long, M.B., B.S., Ph.D. (London, 1952, 1957), *Associate in Pediatrics; Associate Professor of Physiology; Professor of Community Health Sciences; and Associate Director, Undergraduate Medical Education*
- Thomas D. Long, M.D. (Bowman Gray, 1952), *Clinical Associate in Medicine, Roxboro, N.C.*
- William K. Longley, Ph.D. (London, 1963), *Associate Professor of Anatomy*
- Hans Lowenbach, M.D. (Hamburg, 1929), *Assistant Professor of Pediatrics and Professor of Psychiatry*
- William W. Lowrance, *Adjunct Assistant Professor of Hospital Admin-*

- istration and Director of Hospital Division of Regional Medical Program*
- Ronald B. Luftig, Ph.D. (Univ. of Chicago, 1967), *Assistant Professor of Microbiology*
- Steven Lunzer, M.D. (Budapest, 1967), *Instructor in Medicine*
- Emmett S. Lupton, M.D. (New York, 1938), *Clinical Associate in Dermatology, Greensboro, North Carolina*
- John A. Lusk, M.D. (Alabama, 1951), *Clinical Associate in Medicine, Greensboro, N.C.*
- William S. Lynn, M.D. (Columbia, 1946), *Associate Professor of Biochemistry and Professor of Medicine and Endocrinology*
- George M. Lyon, Jr., M.D. (Duke, 1961), *Assistant Professor of Pediatrics*
- Ted A. Maag, D.V.M. (Georgia, 1962), *Research Associate in Surgery*
- George L. Maddox, Jr., Ph.D. (Michigan State, 1956), *Professor of Medical Sociology and Professor of Sociology*
- M. Stephen Mahaley, M.D. (Duke, 1959), *Assistant Professor of Neurosurgery and Anatomy*
- James L. Males, M.D. (Oklahoma, 1966), *Instructor in Medicine*
- Joseph M. Malin, M.D. (Georgetown, 1961), *Assistant Professor of Urology*
- James D. Mallory, Jr., M.D. (Duke, 1958), *Assistant Professor of Psychiatry, Staff, Highland Hospital, Asheville, North Carolina*
- Joseph E. Markee, Ph.D. (Chicago, 1929), *James B. Duke Professor of Anatomy and Consultant to the Director of Medical Education for Audiovisual Education*
- Gail R. Marsh, Ph.D. (Univ. of Iowa, 1968), *Associate in Medical Psychology*
- Frances M. Martin, M.S.W. (North Carolina, 1968), *Instructor in Psychiatric Social Work*
- Frank F. Martin, M.D. (Medical Coll. of South Carolina, 1963), *Instructor in Medicine*
- Joan C. Martin, Ph.D. (Florida State Univ., 1965), *Assistant Professor of Medical Psychology and Research Associate in Anatomy*
- Robert M. Martin, Jr., M.D. (Emory, 1952), *Instructor in Psychiatry*
- Lockert B. Mason, M.D. (Med. Coll. of Virginia, 1945), *Assistant Clinical Professor of Surgery, Wilmington, N.C.*
- Raymond Massengill, Jr., M.S. (Tennessee, 1959), *Assistant Professor of Medical Speech Pathology*
- Kenneth M. Matchett, M.D. (Cornell, 1967), *Instructor in Medicine*
- Robert S. Mathews, M.D. (Duke, 1964), *Instructor in Orthopaedic Surgery*
- F. Maxton Mauney, Jr., M.D. (Duke, 1959), *Assistant Professor of Surgery and Assistant Professor of Community Health Sciences*
- Demmie G. Mayfield, M.D. (Texas, Med. Br., 1958), *Associate Professor of Psychiatry*

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Everett N. McCormick, M.D. (Univ. of Florida, 1963), *Associate in Radiology*

Ronald L. McGowan, M.D. (Temple, 1958), *Instructor in Medicine*

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Patrick A. McKee, M.D. (Oklahoma, 1962), *Associate in Medicine*

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Robert McLelland, M.D. (Cincinnati, 1948), *Assistant Clinical Professor of Radiology*

Michael E. McLeod, M.D. (Duke, 1960), *Assistant Professor in Medicine*

Samuel M. McMahon, M.D. (Ohio, 1962), *Associate in Medicine*

Thomas J. McManus, M.D. (Boston, 1955), *Associate Professor of Physiology*

Jesse N. McNeill, M.D. (Arkansas, 1960), *Instructor in Psychiatry*

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Samuel D. McPherson, M.D. (Johns Hopkins, 1943), *Clinical Associate in Ophthalmology*

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Elias Meezan, Ph.D. (Duke, 1966), *Assistant Professor of Pharmacology*

Lorne M. Mendell, Ph.D. (Mass. Inst. of Tech., 1965), *Assistant Professor of Physiology and Pharmacology*

Elijah E. Menefee, Jr., M.D. (Duke, 1936), *Professor of Medicine*

- Richard S. Metzgar, Ph.D. (Buffalo, 1959), *Associate Professor of Immunology*
- Leslie C. Meyer, M.D. (Nebraska, 1943), *Clinical Lecturer in Orthopaedics and Orthopaedic Surgeon, Shriners' Hospital for Crippled Children, Greenville, S.C.*
- Donald S. Miller, M.D. (Harvard, 1962), *Associate in Medicine*
- George R. Miller, M.D. (Rochester, 1943), *Clinical Lecturer in Orthopaedics and Associate Surgeon, N.C. Orthopaedic Hospital, Gastonia, N.C.*
- James A. Miller, R.T. (Iowa, 1959), *Technical Director in Radiology*
- Oscar L. Miller, M.D. (Emory, 1921), *Clinical Lecturer in Orthopaedics and Orthopaedic Surgeon, Charlotte Memorial Hospital, Charlotte, N.C.*
- Elliott Mills, Ph.D. (Columbia, 1964), *Assistant Professor of Physiology and Pharmacology*
- Neil P. Mitchell, B.A.O. (Univ. College, Galway, Eng., 1960), *Associate in Psychiatry*
- Donald M. Monson, M.D. (Wisconsin, 1955), *Assistant Clinical Professor of Radiology, Watts Hospital, Durham, N.C.*
- Ava Ball Moody, C.R.N.A. (Duke School of Anesthesia, 1961), *Assistant Nurse Anesthetist*
- Donald T. Moore, M.D. (Meharry, 1958), *Clinical Instructor in Obstetrics and Gynecology*
- John A. Moore, M.D. (Med. Coll. of Virginia, 1948), *Clinical Associate in Medicine, Greensboro, N.C.*
- John W. Moore, Ph.D. (Virginia, 1945), *Professor of Physiology*
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Soong H. Lee, M.D. (Korea, 1963), *Resident in Psychiatry*

Lewis G. Lefer, M.D. (Virginia, 1969), *Intern in Medicine*

Hannah V. Leonhardt, M.D. (Germany, 1949), *Assistant Resident in Pathology*

Benton B. Levie, M.D. (Duke, 1969), *Intern in Pediatrics*

Gary M. Levine, M.D. (New York, 1968), *Assistant Resident in Medicine*

Edward B. Lewin, M.D. (New York, 1966), *Assistant Resident in Pediatrics*

Hshu-Hshing Lin, M.D. (Taiwan, 1964), *Assistant Resident in Pathology*

Lewis H. Lipsius, M.D. (Emory, 1964), *Assistant Resident in Psychiatry*

William S. Logan, M.D. (Duke, 1968), *Assistant Resident in Dermatology*

Gerald L. Logue, M.D. (Pittsburgh, 1966), *Fellow in Hematology*

James T. Lowe, Jr., M.D. (Medical College of Georgia, 1969), *Intern in Surgery*

Laura L. Lowenbergh, M.D. (Ohio, 1966), *Assistant Resident in Psychiatry*

A. Harold Lubin, M.D. (Iowa, 1965), *Assistant Resident in Pediatrics*

Bruce A. Lucas, M.D. (Duke, 1965), *Assistant Resident in Urology*

Steven Lunzar, M.D. (Hungary, 1947), *Fellow in Neurology*

Angus M. McBryde, Jr., M.D. (Duke, 1963), *Assistant Resident in Orthopaedic Surgery*

George M. McCord, Jr., M.D. (Emory, 1965), *Resident in Radiology*

Everett N. McCormick, M.D. (Florida, 1963), *Resident in Radiology*

- Louis H. McCraw, Jr., M.D. (Mississippi, 1963), *Assistant in Plastic Surgery*
- Ronald L. McGowan, M.D. (Temple, 1958), *Fellow in Cardiology*
- Frank H. McGregor, Jr., M.D. (Duke, 1965), *Assistant Resident in Surgery*
- Donald McOmish, M.D. (Australia, 1962), *Assistant Resident in Urology*
- James L. Males, M.D. (Oklahoma, 1966), *Fellow in Endocrinology*
- Paul S. Mandala, M.D. (New York Medical College, 1963), *Fellow in Pediatric Cardiology*
- Donald F. Mandetta, M.D. (Duke, 1968), *Assistant Resident in Medicine*
- R. Wade Markham, M.D. (Duke, 1963), *Chief Resident in Dermatology*
- George B. Maroulis, M.D. (Albany Medical College, 1967), *Assistant Resident in Obstetrics and Gynecology*
- Robert N. Marshall, Jr., M.D. (Duke, 1967), *Assistant Resident in Pediatrics*
- Walter H. Marshall, Jr., M.D. (Florida, 1969), *Intern in Medicine*
- Edward S. Martin, M.D. (Pennsylvania, 1969), *Intern in Pediatrics*
- Frank F. Martin, M.D. (South Carolina, 1963), *Fellow in Gastroenterology*
- Salutario J. R. Martinez, M.D. (Havana School of Medicine, 1961), *Assistant Resident in Radiology*
- Stuart J. Masters, M.D. (Duke, 1969), *Assistant Resident in Medicine*
- Kenneth M. Matchett, Jr., M.D. (Cornell, 1967), *Fellow in Hematology*
- Robert S. Mathews, M.D. (Duke, 1964), *Assistant Resident in Orthopaedic Surgery*
- Robert G. Matthews, M.D. (Michigan, 1968), *Assistant Resident in Medicine*
- Leo F. Mazzocchi, M.D. (Medical College of Virginia, 1964), *Resident in Radiology*
- David B. Melvin, M.D. (Tennessee, 1967), *Assistant Resident in Surgery*
- Wolfgang J. Mergner, M.D. (Germany, 1961), *Fellow in Pathology*
- Roger C. Millar, M.D. (Utah, 1969), *Intern in Surgery*
- Frederick V. Minkow, M.D. (Michigan, 1964), *Assistant Resident in Orthopaedic Surgery*
- Gordon F. Moor, M.D. (Nebraska, 1959), *Teaching Resident in Surgery (England)*
- Terence N. Moore, M.D. (Duke, 1968), *Assistant Resident in Radiology*
- S. David Morrison, M.D. (Tennessee, 1965), *Assistant Resident in Psychiatry*
- Rodney A. Mortenson, M.D. (South Carolina, 1967), *Assistant Resident in Orthopaedic Surgery*
- H. Brent Mundy, M.D. (Western Ontario, 1965), *Assistant Resident in Medicine*
- John R. Musser, M.D. (Pennsylvania, 1962), *Assistant Resident in Orthopaedic Surgery*

W. Stanley Myers, M.D. (Tennessee, 1969), *Fellow in Pulmonary Disease*
 Kouji Nakajima, M.D. (Tokyo, 1954), *Fellow in Nephrology*
 Richard J. Nasca, M.D. (Georgetown, 1964), *Assistant Resident in Orthopaedic Surgery*
 James L. Nash, M.D. (Duke, 1966), *Chief Resident in Psychiatry*
 Theodore E. Nash, M.D. (Miami, 1968), *Assistant Resident in Medicine*
 Francis A. Neelon, M.D. (Harvard, 1962), *Chief Resident in Medicine*
 Douglas F. Newton, M.D. (Syracuse, 1968), *Assistant Resident in Medicine*
 Khye Weng Ng, M.D. (Malaya, 1956) (*see Weng*)
 Charles J. Niemeyer, M.D. (Duke, 1966), *Assistant Resident in Orthopaedic Surgery*
 Tom D. Nichol, M.D. (Tennessee, 1963), *Assistant Resident in Plastic Surgery*
 Frederick C. Norcross, M.D. (George Washington, 1964), *Assistant Resident in Pediatrics*
 C. Bryan Norton, Jr., M.D. (Duke, 1966), *Resident in Psychiatry*
 William A. Nottebohm, M.D. (Argentina, 1962), *Fellow in Nephrology*
 James G. Nuckolls, M.D. (Duke, 1966), *Assistant Resident in Medicine*
 William S. Ogden, M.D. (Medical College of Georgia, 1965), *Assistant Resident in Orthopaedic Surgery*
 Gen Ohi, M.D. (Japan, 1963), *Fellow in Hematology*
 Robert A. Older, M.D. (Duke, 1968), *Assistant Resident in Radiology*
 H. Newland Oldham, Jr., M.D. (Baylor, 1961), *Chief Resident and Teaching Scholar in Surgery*
 William W. O'Neill, M.D. (Oklahoma, 1969), *Intern in Medicine*
 S. Kirby Orme, M.D. (Cornell, 1962), *Assistant Resident in Surgery*
 Edward M. Overfield, M.D. (Georgetown, 1967), *Assistant Resident in Medicine*
 E. Capers Palmer, Jr., M.D. (Emory, 1966), *Assistant Resident in Pathology*
 Pasit Panijayanond, M.D. (Thailand, 1965), *Fellow in Surgery*
 Charles H. Parker, M.D. (Pittsburgh, 1964), *Chief Resident in Obstetrics and Gynecology*
 Michael D. Parker, M.D. (Duke, 1968), *Assistant Resident in Medicine*
 Mary A. C. Passero, M.D. (Harvard, 1969), *Intern in Pediatrics*
 Michael A. Passero, M.D. (Harvard, 1969), *Intern in Medicine*
 David F. Paulson, M.D. (Duke, 1964), *Assistant Resident in Urology*
 Charles V. Peery, M.D. (Duke, 1968), *Assistant Resident in Obstetrics and Gynecology*
 Richard A. Perryman, M.D. (London, 1967), *Assistant Resident in Surgery*
 Lloyd J. Peterson, M.D. (Northwestern, 1969), *Intern in Surgery*
 David N. Pfohl, M.D. (Pennsylvania, 1969), *Intern in Surgery*

- Richard L. Pietsch, M.D. (Virginia, 1966), *Assistant Resident in Ophthalmology*
- Gary G. Poehling, M.D. (Marquette, 1968), *Assistant Resident in Surgery*
- Mark H. Pohlman, M.D. (Columbia, 1963), *Assistant Resident in Orthopaedic Surgery*
- Edward P. Politowicz, M.D. (Temple Univ. School of Dentistry, 1964), *Assistant Resident in Oral Surgery*
- Jerko Poklepovic, M.D. (Yugoslavia, 1965), *Assistant Resident in Radiology*
- John M. Porter, M.D. (Duke, 1962), *Chief Resident in Surgery*
- Charles L. Puckett, M.D. (Bowman Gray, 1966), *Assistant Resident in Surgery*
- Kenneth E. Quickel, Jr., M.D. (Johns Hopkins, 1964), *Fellow in Endocrinology*
- Michael G. Quinn, M.D. (Miami, 1965), *Assistant Resident in Pathology*
- John N. Ralsten, M.D. (West Virginia, 1965), *Resident in Radiology*
- David C. Rausch, M.D. (Ohio, 1962), *Fellow in Pulmonary Disease*
- Ritz C. Ray, Jr., M.D. (Duke, 1961), *Assistant Resident in Psychiatry*
- Terence N. Reisman, M.D. (Duke, 1968), *Assistant Resident in Medicine*
- John R. Rice, M.D. (Miami, 1968), *Assistant Resident in Medicine*
- N. Mark Richards, M.D. (Wisconsin, 1966), *Assistant Resident in Medicine*
- Daniel H. Riddick, M.D. (Duke, 1967), *Assistant Resident in Obstetrics and Gynecology*
- Charles P. Riley, M.D. (Duke, 1965), *Assistant Resident in Medicine*
- Malcolm G. Robinson, M.D. (Oklahoma, 1968), *Fellow in Gastroenterology*
- Charles R. Roe, M.D. (Duke, 1964), *Fellow in Pediatric Endocrinology*
- Roy S. Rogers, III, M.D. (Ohio State, 1966), *Fellow in Dermatology*
- Stephen G. Romeo, M.D. (Seton Hall, 1964), *Assistant Resident in Dermatology*
- Robert A. Rosati, M.D. (Duke, 1967), *Fellow in Cardiology*
- R. Peter Rosier, M.D. (New York, 1966), *Assistant Resident in Pathology*
- Michael Rotman, M.D. (Texas, 1966), *Assistant Resident in Medicine*
- M. Henderson Rourk, Jr., M.D. (Pennsylvania, 1963), *Fellow in Pediatrics*
- David W. Rowe, M.D. (Vermont, 1969), *Intern in Medicine*
- Jonelle C. Rowe, M.D. (Vermont, 1969), *Intern in Pediatrics*
- Vernon D. Rowe, III, M.D. (Duke, 1969), *Fellow in Pediatrics*
- John R. Royer, M.D. (Louisiana State, 1954), *Chief Resident in Plastic Surgery*
- Marvin P. Rozear, M.D. (Duke, 1966), *Assistant Resident in Neurology*
- Carl J. Rubenstein, M.D. (Duke, 1964), *Assistant Resident in Medicine*

Robert J. Ruderman, M.D. (Rochester, 1968), *Assistant Resident in Surgery*

Alfred J. Rufty, Jr., M.D. (Louisiana State, 1961), *Fellow in Cardiology*

Jerome E. Rygorsky, M.D. (Columbia, 1962), *Fellow in Cardiology*

Somphong Sahaphong, M.D. (Thailand, 1967), *Fellow in Pathology*

Duke S. Samson, M.D. (Washington, 1969), *Intern in Surgery*

Edgar J. Sanford, M.D. (Duke, 1965), *Fellow in Urology*

Wade H. Saunders, III, M.D. (Duke, 1967), *Fellow in Cardiology*

Michael A. Savin, M.D. (Pittsburgh, 1969), *Intern in Medicine*

Neil R. Schram, M.D. (New York Med. Coll., 1963), *Fellow in Nephrology*

Donald P. Schwartz, M.D. (Seton Hall, 1963), *Fellow in Pediatric Allergy*

Ronald P. Seningen, M.D. (Duke, 1960), *Assistant Resident in Radiology*

James K. Sexton, M.D. (Bowman Gray, 1959), *Resident in Radiology*

Jack E. Shalley, M.D. (Iowa, 1967), *Assistant Resident in Psychiatry*

Gabriel A. Shapiro, M.D. (Oklahoma, 1969), *Intern in Medicine*

John P. Sheehan, M.D. (New Jersey Coll. of Med., 1965), *Assistant Resident in Pathology*

Mohamed J. Sheikholislam, M.D. (Iran, 1962), *Fellow in Anesthesiology*

Glen H. Shepard, M.D. (Virginia, 1962), *Assistant Resident in Plastic Surgery*

Joseph R. Silvio, M.D. (Harvard, 1969), *Intern in Pediatrics*

W. Laurence Simpson, M.D. (Australia, 1954), *Fellow in Surgery*

E. Mitchell, Singleton, M.D. (Washington Univ., 1964), *Assistant Resident in Ophthalmology*

Michael A. Sisk, M.D. (Bowman Gray, 1967), *Assistant Resident in Pediatrics*

Selvadurai, Sivalingam, M.D. (Malaya, 1965), *Assistant Resident in Neurosurgery*

Jay S. Skyler, M.D. (Jefferson Med. Coll., 1969), *Intern in Medicine*

D. Graham Slaughter, M.D. (Duke, 1964), *Chief Resident in Neurosurgery*

Charles D. Smith, M.D. (Duke, 1969), *Intern in Pediatrics*

James T. Smith, M.D. (Kansas, 1965), *Resident in Radiology*

Robert J. Snowe, M.D. (New York, 1964), *Fellow in Pediatrics*

Douglas W. Soderdahl, M.D. (Northwestern, 1965), *Assistant Resident in Urology*

Lawrence E. Southworth, M.D. (Medical College of Virginia, 1964), *Resident in Radiology*

Ellis M. Sowell, II, M.D. (Southwestern, 1961), *Chief Resident in Obstetrics and Gynecology*

William H. Spencer, III, M.D. (Duke, 1965), *Assistant Resident in Medicine*

Peter D. Springberg, M.D. (Wisconsin, 1966), *Fellow in Nephrology*

- Thomas L. Standlee, M.D. (St. Louis, 1967), *Assistant Resident in Dermatology*
- Sidney F. Stein, M.D. (Cornell, 1969), *Intern in Medicine*
- Elliott W. Stevens, Jr., M.D. (North Carolina, 1966), *Assistant Resident in Medicine*
- Karl W. Stevenson, M.D. (Bowman Gray, 1966), *Resident in Psychiatry*
- Kathleen K. Stewart, M.D. (California, 1931), *Fellow in Geropsychiatry*
- Woodhall Stopford, M.D. (Harvard, 1969), *Intern in Medicine*
- Steven L. Stroup, M.D. (Illinois, 1968), *Assistant Resident in Radiology*
- Harry B. Stone, III, M.D. (Duke, 1965), *Chief Resident in Otolaryngology*
- Abraham Sudilovsky, M.D. (Argentina, 1964), *Fellow in Psychiatry*
- Charles V. Taft, M.D. (Duke, 1968), *Assistant Resident in Surgery*
- Raymond M. Taniguchi, M.D. (Tulane, 1960), *Chief Resident in Neurosurgery*
- Henry A. Tarrasch, M.D. (Washington University School of Dentistry, 1966), *Intern in Oral Surgery*
- Nelson S. Teague, M.D. (Bowman Gray, 1962), *Chief Resident in Urology*
- Veda N. Thakur, M.D. (India, 1963), *Fellow in Orthopaedic Surgery*
- M. David Thier, M.D. (Florida, 1962), *Assistant Resident in Ophthalmology*
- Richard M. Thompson, M.D. (West Virginia, 1963), *Resident in Radiology*
- Thomas T. Thompson, M.D. (Med. Coll. of Virginia, 1964), *Resident in Radiology*
- Anthony S. Torray, Jr., M.D. (Jefferson, 1969), *Intern in Medicine*
- David M. Treiman, M.D. (Stanford, 1967), *Assistant Resident in Medicine*
- James W. Turner, Jr., M.D. (Duke, 1964), *Assistant Resident in Medicine*
- James W. Tyson, M.D. (Arkansas, 1968), *Assistant Resident in Radiology*
- John R. Ujda, M.D. (Marquette, 1969), *Intern in Medicine*
- Thomas D. Vance, M.D. (Duke, 1956), *Resident in Radiology*
- Randall B. Vanderbeek, M.D. (Duke, 1963), *Assistant Resident in Urology*
- Ray V. Varner, M.D. (North Carolina, 1962), *Fellow in Psychiatry*
- Wayne B. Venters, M.D. (North Carolina, 1964), *Assistant Resident in Orthopaedic Surgery*
- Joseph R. Vilseck, Jr., M.D. (West Virginia, 1966), *Fellow in Pulmonary Disease*
- Michael R. Volow, M.D. (Seton Hall, 1964), *Assistant Resident in Psychiatry*
- Galen S. Wagner, M.D. (Duke, 1965), *Fellow in Cardiology*
- Jack G. Wall, M.D. (North Carolina, 1968), *Assistant Resident in Radiology*

Geoffrey A. Wardwell, M.D. (Ohio State, 1968), *Assistant Resident in Radiology*
 L. Leslie Wasserman, Jr., M.D. (Duke, 1966), *Assistant Resident in Obstetrics and Gynecology*
 Menashe B. Waxman, M.D. (McGill, 1963), *Fellow in Cardiology*
 Emil L. Weber, M.D. (Indiana, 1964), *Assistant Resident in Neurosurgery*
 Andrew S. Wechsler, M.D. (New York, 1964), *Assistant Resident in Surgery*
 John C. Weed, Jr., M.D. (Tulane, 1968), *Assistant Resident in Obstetrics and Gynecology*
 Samuel A. Wells, Jr., M.D. (Emory, 1961), *Chief Resident in Surgery*
 Ng Khye, Weng, M.D. (Malaya, 1965), *Assistant Resident in Neurology*
 Lineu C. Werneck, M.D. (Brazil, 1966), *Resident in Neurology*
 Linton B. West, Jr., M.D. (Vanderbilt, 1962), *Chief Resident in Urology*
 Alan D. Whanger, M.D. (Duke, 1956), *Fellow in Geropsychiatry*
 Jack D. Williams, M.D. (Duke, 1965), *Assistant Resident in Otolaryngology*
 H. James Williams, Jr., M.D. (Utah, 1969), *Intern in Medicine*
 Randal J. Williams, M.D. (Duke, 1968), *Fellow in Medicine*
 James W. Wilson, M.D. (Duke, 1968), *Fellow in Pathology*
 Charles E. Wisor, M.D. (Pennsylvania, 1964), *Assistant Resident in Ophthalmology*
 Walter G. Wolfe, M.D. (Temple, 1963), *Assistant Resident in Surgery*
 W. Thomas Woodard, M.D. (Duke, 1967), *Assistant Resident in Surgery*
 James N. Woody, M.D. (Loma Linda, 1968), *Assistant Resident in Pediatrics*
 Kinsman E. Wright, Jr., M.D. (Boston, 1964), *Fellow in Cardiology*
 Thomas H. Wyatt, M.D. (Florida, 1965), *Assistant Resident in Obstetrics and Gynecology*
 R. Martin York, M.D. (Med. Coll. of Georgia, 1969), *Intern in Medicine*
 Noel W. Young, Jr., M.D. (Duke, 1963), *Resident in Ophthalmology*
 Joseph P. Zaepfel, M.D. (Duke, 1965), *Assistant Resident in Surgery*
 Robert E. Zipe, Jr., M.D. (Ohio, 1966), *Assistant Resident in Pathology*



General Information

In 1924, James Buchanan Duke established The Duke Endowment, and thus made possible the creation of Duke University.

I have selected Duke University as one of the principal objects of this trust because I recognize that education, when conducted along sane and practical, as opposed to dogmatic and theoretical lines, is, next to religion, the greatest civilizing influence.

I have selected hospitals as another of the principal objects of this trust because I recognize that they have become indispensable institutions, not only by way of ministering to the comfort of the sick, but in increasing the efficiency of mankind and prolonging human life. . . . I very much hope that the people will see to it that adequate and convenient hospitals are assured in their respective communities. . . . It is to these rural districts that we are to look in large measure for the bone and sinew of our country.

In Item VIII of his will, Mr. Duke bequeathed to The Duke Endowment ten million dollars for Duke University, of which four million dollars was to be expended for a medical school, hospital, and nurses' home at Duke University.

Wards and clinics were named for eminent physicians and surgeons in order to remind the staff and students of what has been accomplished in medicine, as well as to follow Mr. Duke's Indenture: "I advise courses in history, especially the lives of the great of the earth."

The Council on Medical Education and Hospitals of the American

Medical Association gave Duke Class A approval in 1929 before the faculty and buildings were completed.

Announcements were then inserted in college papers that applications for the study of medicine, nursing, dietetics, hospital administration, and other health professions would be considered in 1930.

Duke Hospital was opened for patients on July 21, 1930. The first students in hospital administration were admitted on July 1, 1930; the first dietetic student on August 15, 1930; the first medical students (1st and 3rd year) on October 2, 1930; and the first student nurses on January 2, 1931. The schools and hospital were dedicated on April 20, 1931.

On the advice of Dr. Harvey Cushing and Dr. Henry A. Christian of Harvard, most of the faculty were appointed on "geographic" full time, so that private patients could obtain as good medical and surgical care as that given to the charity patients. Therefore, on September 15, 1931, the Private Diagnostic Clinic (PDC) was organized to improve the facilities for private patients, especially for those of moderate means.

Soon other additions became necessary, as students, faculty, and patients increased in numbers. The Baker House (originally for nurses, 1932) and the PDC wing (June, 1940), were provided by The Duke Endowment and Duke University. The W. B. Bell Research Building was started in 1940 with funds from the PDC, the Rockefeller Foundation, the Dorothy Beard Research Fund, and The Duke Endowment and was expanded by funds from the National Institutes of Health, the Markle Foundation, and Duke University. The Erwin Road Nurses' Dormitory (now Hanes House Annex) was built (1943) with funds from The Duke Endowment and the U. S. Public Health Service. The Elizabeth P. Hanes House for Nurses (1950) was a gift from Mrs. Frederic M. Hanes, with additional funds from the N. C. Medical Care Commission. The North Carolina Cerebral Palsy Hospital, which is directed by Duke, was dedicated on March 30, 1950. The Durham Veterans Administration Hospital, which is affiliated with Duke, was completed and dedicated in 1953. The W. S. Rankin Out-patient and PDC wing (1954) were financed by the PDC, The Duke Endowment, and the N. C. Medical Care Commission. The Geriatrics and the Diagnostic and Treatment wings (1963) were built with funds from the National Institutes of Health, the PDC, and The Duke Endowment.

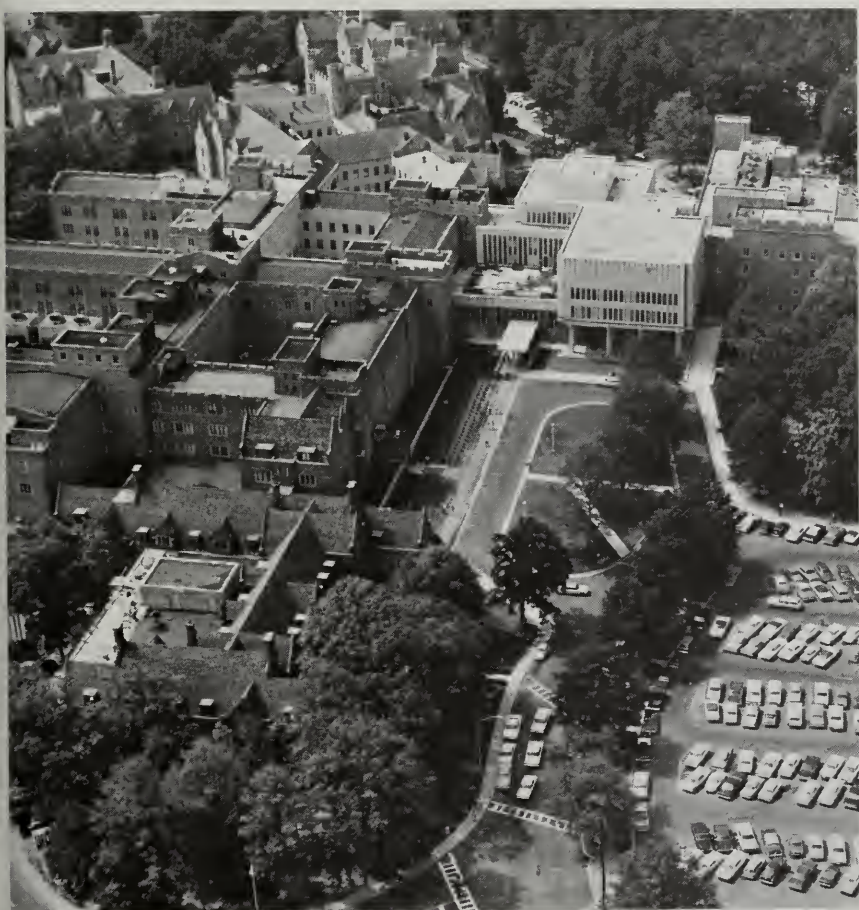
Additional patient care facilities and an enlarged emergency out-patient clinic were provided in 1967 with the opening of the Main Entrance Building and in 1968 with occupancy of Rehabilitation Facility I. Designed to house an extensive hyperbaric facility and related research laboratories, Clinical Research II was completed in 1967. In December, 1968, the Nanaline H. Duke Medical Sciences Building was dedicated. This facility contains the research and teaching programs of several preclinical departments.

Today, Duke University Medical Center continues to strive to lead

contemporary medicine. This involves maintaining superiority in its four primary functions: unexcelled patient care, dedication to its educational programs, national and international distinction in the quality of its research, and service to the region.

Growth is identified with a deeper involvement in the social aspects of health, the establishment of many advanced therapeutic and research facilities, a building program that will require one or more decades for its completion, and a new and imaginative revision of the medical teaching program that has attracted the attention of educators across the globe.

In the years to come, Duke University Medical Center will continue to adapt, experiment, and innovate in all aspects of its functions, basing changes upon its traditions and upon its aspirations for service to mankind everywhere.



Courses of Study and Requirements for Degrees

The New Medical Curriculum

In recent years, analysis and appraisal of the curriculum in medical schools has caused changes in many. Several factors have required these changes, important among them being the increasing scope and complexity of medicine generally, and the dissatisfaction with the sharp cleavage between basic science and clinical years. As a result of long study, the Duke University School of Medicine instituted a major revision of the curriculum beginning with the class starting in the fall of 1966.

The aims of the present curriculum are: (1) to provide a strong academic basis for a lifetime of growth within the profession of medicine, with the development of technical competency, proficiency, and the proper attitudes peculiar to the practice of medicine as well as appreciation of the broader social and service responsibilities; (2) to establish for the first year a basic science program which will fulfill the purposes of the increasingly heterogeneous student body; (3) to offer both clinical and basic science education simultaneously; (4) to permit the student to explore his personal intellectual preferences and capabilities; (5) to allow study in depth in selected areas, either clinical or basic science; (6) to provide greater freedom of course selection and thus to encourage earlier career decision; and (7) to achieve better

integration of the medical school curriculum with residency training and the practice of medicine.

The curriculum, while offering a previously unattainable degree of flexibility to medical education and new opportunities for intellectual exploration, also makes heavy demands upon the student. It should be recognized that a medical student at Duke University School of Medicine is expected to maintain a consistent level of attainment and to demonstrate qualities of initiative and dedication to his chosen profession. A scholarly attitude toward medicine that will continue throughout an entire career is an important objective of the medical school. The foundations of this attitude to learning should accompany the student when he enters.

It is expected that students will dedicate daily several hours to private study, utilizing the resources available in the Medical Center library and those provided by themselves and by other facilities of Duke University. During the University term, private study should also occupy part of each weekend.

A student is expected to maintain at all times a professional attitude toward patients, to respect confidences, and to recognize that he is the recipient of privileged information only to be discussed within the context of scholarship and in circumstances that truly contribute to the educational process or the care of the patient. This attitude involves consideration not only of speech and personal appearance but also of morality, honor, and integrity.

A special examination will be taken annually by all medical students. The examination, comprising two 3-hour papers, is administered on a single day each year. Freshman medical students take this examination on the second day of medical school, in addition to subsequent examinations in May. The results of these examinations will be included in each student's record. In addition all students are required to take Part I of the National Board Examinations at the end of their first year of medical school.

Doctor of Medicine Degree

The degree of Doctor of Medicine is awarded upon approval by the faculty of Duke University to those students who have completed the curriculum of the School of Medicine to the satisfaction of the Medical School Advisory Committee, and who have demonstrated their fitness to practice medicine by adherence to a high standard of ethical behavior and morality and paid or made satisfactory arrangements to pay all indebtedness to the University.

Course Requirements

First Year

The student will study the principles of all the basic science disciplines. Rather than mastering an encyclopedic array of facts, the purpose will be to acquire familiarity with the major principles of each subject. An introduction to clinical medicine, will be presented by the clinical services. The year will be divided into two terms, each of eighteen weeks, as follows:

<i>Term 1</i>	<i>Hours</i>
Anatomy	198
Biochemistry	157
Physiology	116
Human Behavior	43
Genetics	32
Basic Neurological Sciences	92
Orientation	6
Unassigned time for study	132
	776

<i>Term 2</i>	<i>Hours</i>
Pathology	206
Clinico-Pathological Conferences	11
Microbiology	147
Pharmacology	121
Human Behavior	10
Introduction to Clinical Medicine	96
Unassigned time for study	134
	725

Second Year

The second year will provide an exposure to clinical science disciplines permitting the student early in his career to become a participant in the care of patients. The acquired appreciation of the problems of the clinical areas and the opportunities to recognize the applications of the basic sciences should lead to a more meaningful selection of courses for the subsequent two years. The second year will be divided into five terms of approximately seven weeks each as follows: medicine, obstetrics, pediatrics, psychiatry, and surgery.

In addition, instruction will take place in community health sciences (70 hours); radiology (72 hours); and emergency and disaster surgery (44 hours).

Third and Fourth Years

These two years will be made up of elective courses, as flexible as possible within requisite limitations. Each student will select professional advisers from the preclinical and clinical faculties. These individuals will assist the student in formulating his program for the third and fourth years. Approximately one-half the time will be spent in basic science and one-half in clinical science. Completion of the Medical Research Training Program or one of the special study programs may fulfill the requirements for basic science.

The elective courses of study offered are described under each department. The wide selection affords an opportunity for each student to design his program to satisfy best his needs in conformity with his medical future, with guidance from his advisers. Note that an asterisk placed before the course number (*ANA-206B) indicates that the course follows the timetable of the Graduate School.

As an alternative after completion of the second year, the student may enroll as a Ph.D. candidate in one of the basic sciences, earning this degree in two or three years. Then, having completed three of the four years necessary for an M.D., he may earn the M.D. degree by completing a fourth clinical year.

The third and fourth years will be divided into eight terms of nine weeks each. Certain courses as noted will be offered during the summer term.

Promotion

The records of each student in the first and second years are reviewed periodically by promotion committees, which are made up of the department chairmen. The Medical School Advisory Committee acts on recommendations from these promotion committees and may:

1. Promote to the next year those students whose work is good.
2. Warn those students whose work is less than good that they must improve their scholastic endeavor.
3. Place on probation those students whose work is poor.
4. Request the resignation of any student who is considered an unpromising candidate for the degree of Doctor of Medicine.

A student wishing to appeal a decision may do so to the Director within two weeks of his notification.

The Director, with the advice of the Medical School Advisory Committee, reserves the right to require the withdrawal of any student at any time if, in the opinion of the majority of committee members, he should not continue his course.

Combined M.D.-Ph.D. Training Programs

Medical Scientist Training Program

General Information

The Medical Scientist Training Program is conducted under the auspices of the School of Medicine and the Graduate School and is designed for highly qualified students strongly motivated toward a career in medical sciences. The program will require six to seven years of study and will lead to both an M.D. and a Ph.D. degree. It is probable that the graduates of this Program will follow one of two broad paths. Some will embark directly on careers in teaching and research in one of the basic medical sciences, having acquired some understanding of clinical medicine in this Program. Others will enter residency programs with a background of experience in basic science which will allow them to pursue research careers in clinical medicine without the frustrations due to inadequate training in the basic medical sciences.

Eligibility

Applicants must meet the requirements for admission to both the Medical School, as a candidate for the M.D. degree, and the Graduate School, as a candidate for the Ph.D. degree. In addition to the minimum requirements established by the prior acceptance into the Medical School and the Graduate School, additional course work in science and mathematics as well as previous research experience will count heavily in the selection of candidates.

Financial Support

Those students funded will be offered a traineeship award (MSP trainee) which will include a stipend plus a full tuition allowance. The stipend levels are equivalent to the current U.S. Public Health Service predoctoral and postdoctoral fellowships, and an MSP trainee will be supported until he has completed both degrees, as long as his progress is satisfactory. These stipends include a dependency allowance of \$500.00 per dependent. The stipend levels for a seven-year program begin at \$2,400.00 with yearly increments to \$6,000.00 per year, plus any dependency allowance.

Candidates may also participate as students in the Medical Scientist Training Program without receiving one of the special traineeship awards. Details of the alternate awards will be discussed with candidates on an individual basis.

The Training Program

This program has been designed to offer the student great latitude in the selection of his course material, but the basic requirements will be those described in the following example of a typical program. The first two academic years are composed of the core basic science year and the core clinical science year of the new curriculum for medical students at Duke University. At the completion of the second year, the student enters the graduate program. Following the completion of the requirements for the Ph.D., the student needs one more academic year of clinical training to complete the requirements for the M.D. degree.

Year 1—Core Basic Science Year. This year is made up of material in the basic sciences of anatomy, biochemistry, genetics, microbiology, pathology, pharmacology, and physiology, in addition to an introduction to clinical methods. The students in the Medical Scientist Training Program will work together throughout this first year. At the end of this first year, the student will be familiar with each of the basic sciences and will be in a good position to select his field of graduate study. The summer following the first year can be used in one of two ways: one, the student may spend this time taking additional background courses in mathematics, chemistry, or other fundamental sciences; or two, he may elect to begin his graduate research.

Year 2—Core Clinical Science Year. A comprehensive approach to medicine, oriented to the patient as a whole, will be the basis for the second year curriculum for the medical scientist. During this year, which represents the student's first introduction to clinical medicine, the focus will be upon the total human biological unit rather than upon separate organ systems. The curriculum will be "vertically" integrated, multidisciplinary, and interdepartmental. Stress will be placed upon the continuity of biological processes—from conception through birth, development, and maturation to senescence and death. Special consideration will be given to the pattern of this developmental sequence in the individual, and to the changes in the pattern determined by genetic composition and by alterations brought about through the action of the particular environment in which the patient lives.

During this year the trainee will be taught primarily by one specific group of teacher-investigators from the clinical departments. The program will consist of a special series of seminars and demonstrations plus clinical experience. The clinical experience will parallel the seminar series insofar as possible. For convenience in description, these clinical experiences have been roughly divided into periods. In practice, the entire year will be organized as a unit both in the seminar and the clinical work.

The initial six weeks will be devoted to obstetrics and gynecology, with its considerations of the adult woman, sterility and infertility, con-

ception, maternity, and birth. Two weeks will then be given to a combined interdisciplinary effort between the Departments of Pediatrics and Obstetrics in the area of maternal fetal interaction, birth, and the perinatal period.

The next six weeks will be devoted to pediatrics, with emphasis upon normal development and the aberrations caused by disease. Time will then be allotted to a combined effort of all departments in the area of adolescence, including such social problems as juvenile delinquency.

The Departments of Medicine, Surgery, and Psychiatry will cooperate in the teaching program during the last 21 weeks of the year. Selected patients from these services will be maintained on a "mixed" ward to facilitate and improve this phase of the student's clinical experience. The different types of patients also provide an excellent opportunity for psychologists, social workers, and others to demonstrate the importance of their respective disciplines and attitudes for these patients. Finally, during the terminal weeks of the year, the student will be given the opportunity to appreciate the problems of senescence and the impact of chronic disease upon the individual and his family.

Years 3, 4, and 5—The Graduate Years. During the third, fourth, and fifth, and, if necessary, the sixth year of the program, the student will pursue graduate study in order to satisfy the requirements for the Ph.D. degree. These requirements include: (1) completion of necessary coursework, (2) adequate performance in the preliminary examination, (3) original research suitable for a dissertation, and (4) successful defense of the thesis in the final examination. Detailed description of other general requirements for the Ph.D. degree are set forth in the *Bulletin of the Graduate School*. The standards of performance during this period will be determined by the individual departments concerned. Further details concerning the individual departments may be obtained by writing to the director of graduate studies in a given department.

The graduate curriculum of each student will be worked out in consultation with the director of graduate studies of the department in which the student chooses to work and will require the approval of the Medical Scientist Training Committee. Since most of the ordering ideas and experimental techniques of all of the medical sciences derive from mathematics and the physical sciences, it is essential to ensure that all students in the program have an adequate grounding in these subjects. Because of the close working relationship and geographical proximity of the medical sciences and physical sciences departments at Duke, the setting is unusually favorable for the achievement of that goal.

If the student has not completed a study of differential and integral calculus, he will be required to do so early in his graduate career. This also holds for students who have not had a rigorous course in physical chemistry.

Descriptions of graduate courses in the Departments of Anatomy,

Pathology, Microbiology, Biochemistry-Genetics, and Physiology and Pharmacology are listed in the *Bulletin of the Graduate School*. Students will be encouraged to select courses which are relevant to their own developing individual interests rather than according to a prescribed program which is applied to all students in a given discipline. It is our view that such range, flexibility, and freedom are the essence of graduate education. The original research and dissertation of each student will be supervised by a faculty adviser chosen by the student in consultation with the director of graduate studies in his department. The faculty adviser is the chairman of the student's supervisory committee which must consist of at least three members of the major department. This committee generally administers preliminary (before commencing original research) and final (after completion of dissertation) examinations for the student.

Terminal Year—An Elective Year in Clinical Science. The student will be assigned an adviser from the clinical department in which he is most interested. Together they would construct a highly individualized training plan for that particular student and one that would have a major emphasis relative to the chosen clinical area as well as a minor emphasis in one other field. The integration of research and clinical experience will be carried out in such a way that the student's research competence will be facilitated rather than lost. Therefore, this year will be planned with due regard to the trainee's proposed career in research. This year would give the trainees in the Medical Scientist Training Program further training in clinical medicine and would complement the second or core clinical year, so that the trainee's total clinical experience would approximate that now given in the regular clinical years of medical school (the third and fourth years in the majority of schools). It should be noted that since these students will receive the M.D. degree upon completion of this final year, great care will be taken by the faculty to ensure that the student will be well grounded in the present day concepts of patient care.

Parenthetically, it is hoped that the student's last year would give the student an experience which will not be repeated later during his internship. Rather it should serve to complement these phases of his training. Ideally, the future surgeon, for example, should be exposed to fields other than surgery, since he will receive intensive training in surgery during his residency. The student usually will be tempted to enter immediately upon the area of his primary interest, e.g., surgery. It is partially to offset this tendency that it is stipulated that a student should take a major and minor subject and that the program for the final year should be arranged through consultation by the student with his faculty adviser.

Application and Admission Procedures

1. Complete the application form for the Duke University School of Medicine.

2. Complete the application form for the Medical Scientist Training Program.
3. After preliminary screening, selected candidates will be asked to submit an application to the Graduate School.
4. A member of the Medical Scientist Training Committee will be available to furnish further information to applicants interviewed at Duke. Applicants will be notified of their status not later than January 10.

Further information can be obtained by writing to: Associate Director, Medical Scientist Training Program, Department of Biochemistry, Duke University Medical Center, Durham, North Carolina 27706.

Medical Historian Training Program

General Information

The Medical Historian Training Program is conducted under the auspices of the School of Medicine and the Graduate School and is supported by the Josiah Macy, Jr. Foundation. It is constructed to provide professionally trained medical historians to fill some of the shortages of teachers and research workers that exist in universities throughout this country, and it is intended to provide a unique training opportunity for a small number of highly selected students who anticipate careers in the fields of medicine and medical history. A minimum of six years of graduate study is required, with successful completion leading to both the Doctor of Medicine and Doctor of Philosophy degrees. It is anticipated that graduates of the program will undertake at least one year in post-graduate medical training before embarking on careers in the history of medicine. Graduates are expected to devote their major career efforts to teaching and scholarly activities in the field of the history of medicine, with minor involvement in clinical responsibilities, patient care, or biomedical laboratory research.

Eligibility

Applicants must meet the requirements for admission to both the School of Medicine as a candidate for the M.D. degree and the Graduate School as a candidate for the Ph.D. degree in the Department of History. Applications will be accepted from candidates who wish to enter the program in the first year of medical studies.

In addition to the minimum requirements established by the School of Medicine and the Graduate School, additional course work in history and the history and philosophy of science will count heavily in the selection of candidates.

Financial Support

Students accepted will be offered a traineeship award which includes a stipend and a full tuition allowance.

The award, which will support the trainee throughout a six year combined program as long as his progress is good, includes allowances of \$500 per annum for each dependent and limited travel expenses to attend meetings in the history of medicine. Stipend levels (exclusive of allowances) begin at \$2400 per year, and annual increments raise this to a maximum of \$5500.

The Training Program

The program has been designed to offer the student a great latitude in the selection of his course material, but the basic requirements will be those described in the following example of a typical program. During the first two academic years, full-time courses in the School of Medicine will be followed. The first year comprises the "core" basic science year and the second, the "core" clinical science year. At the end of the second year the student enters the graduate program.

Typically, a candidate for the Ph.D. degree in history devotes approximately two full years to the completion of his required courses, work in seminars, writing a master's thesis, and in preparatory study for his preliminary or qualifying examinations. The actual length of time needed to earn the Ph.D. degree depends upon the number of months beyond this two year period a candidate finds it necessary to devote to research and the writing of his dissertation. The candidate will pursue these studies in the Department of History during the third and fourth academic years of the program.

In the fifth and sixth years, the trainee will return to medical studies and follow the very flexible elective program offered in the third and fourth years of the curriculum of the School of Medicine. During this time a total of up to one quarter can be made available for completing the Ph.D. degree in history. Elective credit for this period will be accepted toward completing the requirements for the M.D. degree.

The original research and dissertation of each student will be supervised by a faculty adviser chosen by the student in consultation with the Director of Graduate Studies in the Department of History. It is not required that the faculty adviser be a member of the department in which the student will take his degree; therefore, it is possible for a student to undertake dissertation work at another institution in this country or abroad. If the personal interests or required research of the individual student demand work away from Duke for any considerable period of time, the anticipated schedule for completion of the double-degree program may be somewhat extended; but it is anticipated that a total of six years will normally prove adequate.

Following the sequence described above, a candidate could complete the requirements for the A.M. degree in history by the end of the fourth academic year of the program. By the end of his sixth year, he could receive both the M.D. and Ph.D. degrees.

Students in the program will be expected to devote the summer following completion of their first year in medical school working in some aspect of the history of medicine to prepare for the regular course work in history that will begin in the third academic year of the program.

Application and Admission Procedures

1. Complete the application form for the Duke University School of Medicine.
2. After preliminary screening, selected candidates will be asked to submit an application to the Graduate School for admission to the Department of History.
3. Customarily, the selection of the trainees will be made from a group of finalists who will be interviewed at Duke University. Applicants will be notified of their status not later than January 10. Application forms and further information may be obtained by writing to the Associate Director, Medical Historian Training Program, Box 3005, Duke University Medical Center, Durham, North Carolina 27706.

The Duke University Program of Combined Medical and Legal Education

M.D.-J.D. Program

The School of Medicine and the School of Law of Duke University have jointly established a unique program of combined medical and legal education. The aim of the program is to provide to a small number of selected individuals the opportunity to acquire a full education in both medicine and law during a six year course of closely integrated study in the two fields. Upon satisfactory completion of the required course of study, candidates will be awarded both the M.D. and the J.D. degrees.

Objectives

The Duke M.D.-J.D. Program seeks to develop a new breed of dual professional who is well grounded both in law and medicine and who can function usefully in any one of numerous academic, governmental, or private professional capacities—in areas of overlap between the two

disciplines. While the traditional meeting ground between law and medicine has been in the courtroom in connection with personal injury and malpractice litigation, entirely new areas of medical-legal interaction have developed in recent years. The program seeks to concentrate its interest and efforts in these emerging fields. The program will thus focus on the legislative and regulatory developments concerning various aspects of medicine and on the role of law in structuring health care delivery systems and in defining the rights and responsibilities of the participants therein. Another important area of concentration will be that of law and psychiatry.

Career Opportunities

The M.D.-J.D. Program will take a keen interest in its graduates and will assist them in finding ways of employing their special skills. It is considered likely that most graduates of the program will take a medical internship before electing a career role as either a physician or a lawyer, using his other professional training as a useful adjunct in the specialty selected. The program reflects the belief that promising career opportunities will be available to graduates of the program, especially in governmental agencies and in universities.

Course of Study

The student in the M.D.-J.D. Program begins his six year course of study in the School of Medicine. As in the regular M.D. program, his first year is devoted to the basic medical sciences and the second year to the basic clinical disciplines. At this point the student switches to the School of Law, where his first year curriculum is the same as that of other law students. During the next two years he selects courses in the Law School which are of special application to his medical-legal interest, and his sixth and final year is spent in elective clinical work in the Medical School, which may be tailored to his specialized needs. In addition, the student will be required to complete additional elective basic science work amounting to eighteen hours or two summer sessions. His other summers will be unscheduled, but opportunities will be presented to engage in medical-legal endeavors suited to his developing interests.

Throughout the six year program the student will have available to him the counsel of faculty members of the two schools to help him in the selection of courses and in the definition of his career objectives.

Eligibility

Applicants for the M.D.-J.D. Program must qualify for admission to both the School of Medicine and the School of Law. In addition, they must apply specifically for admission to the M.D.-J.D. Program, and ap-

plications will be passed upon by the Joint Law-Medicine Committee, which is composed of faculty members from the two schools. Personal interviews will be required.

Because of the special intellectual demands involved in mastering two professions, high standards will be applied in admitting students to the program. Students will also be evaluated on the basis of motivation and demonstrated interest and likely achievement in the fields relevant to the program's concerns.

In view of the highly specialized character of the field, it is anticipated that enrollment in the program will be limited. Probably no more than three students will be accepted in any one year.

Financial Support

At the present time no special financial aid is available to the students enrolled in the M.D.-J.D. Program. However, the regular loan and scholarship resources of the respective professional schools are available to students while they are enrolled. The program is of such a nature that students might find it possible to obtain support from special sources for their education in this field. The University will assist in seeking out such funds and will support students in their applications.

Application Procedure

Application forms for the M.D.-J.D. Program and further information may be obtained by writing to the Dean, Duke University School of Law, Durham, North Carolina 27706.

Medical Undergraduate Special Training and Study Programs

With the objective of affording special opportunities to medical students having interests in particular areas of the biomedical sciences, a series of integrated, interdisciplinary training and study programs have been constructed. Participation in one or other of these programs is an alternative available to medical students in the third and fourth years of their studies. These programs may be supplemented with additional work taken through the medium of the departmental electives described in the section Courses of Instruction.

Resources for Study

Medical Center Library

The Medical Center Library, located in the Davison Building, attempts to provide all services and collections necessary to further educational, research, and clinical activities in the medical field. Extensive reference and bibliographical services are provided. The collection exceeds 95,000 volumes, and 1700 periodicals are received currently. Director, G. S. T. Cavanagh; Associate Director, W. Bird; C. Tatum, M. A. Brown, E. Wheeler, J. Woodburn, K. Kruse, J. Weaver, P. Tavernise.

The Trent Collection in the history of medicine is an unusually fine one, rich in manuscripts and rare books, and providing opportunity for study and research as well as casual reading in the field. Curator, G. S. T. Cavanagh; Assistant Curator, Susan C. Smith.

Duke Hospital

Duke Hospital is an integral part of the Medical Center and currently has 775 beds and 23 bassinets. The hospital directs its efforts toward the three goals of expert patient care, professional education, and service to the community.

One of the largest private hospitals in the South, Duke offers its

patients up-to-date, comprehensive diagnostic and treatment facilities. In addition to traditional nursing wards, special acute care and intensive nursing units are available to seriously ill patients. Ambulatory patients who need little nursing attention may be admitted to a minimal care unit.

Other special facilities for patients include a heart catheterization laboratory, cancer research unit, pulmonary care unit, hyperbaric oxygenation chamber, cardiac care unit, and many more.

Duke patients have their choice of private, semi-private, or ward accommodations. More than 22,000 persons enter the hospital each year.

Surgical facilities include 18 operating rooms where hospital surgeons perform more than 15,000 operative procedures annually. About 1,700 babies are born in Duke's new delivery suite each year.

Outpatient services at Duke Hospital include the public outpatient clinic, two private diagnostic clinics, the employee health office, and the emergency clinic. Total patient visits to these outpatient areas each year number 250,000.

Close working relationships between the hospital and outside private and government health and welfare agencies enhance opportunities for continued care of patients when they leave Duke.

The clinical faculty of Duke University School of Medicine forms the medical staff of Duke Hospital. Thus these physicians participate not only in both undergraduate and graduate medical education but also in active medical practice within the hospital and the private diagnostic clinics.

Duke Hospital is approved for internship and residency training by the Council on Medical Education and Hospitals of the American Medical Association and conducts an active educational program involving approximately 340 house staff members. The hospital is fully accredited by the Joint Commission on Accreditation of Hospitals.

Doctors Hospital

The private, 323-bed Doctors Hospital in Washington, D. C., entered into an agreement with Duke University Medical Center in October, 1969, to expand education facilities for students and staff at both institutions.

Administrators are presently developing opportunities for students, faculty, and staff at Duke to see a working model of a metropolitan hospital, and access to Duke's educational and research facilities for Doctors Hospital physicians.

Highland Hospital

Highland Hospital is a division of the Department of Psychiatry at Duke University Medical Center. It is a 125-bed psychiatric facility located on an 85-acre site in Asheville, N.C.

The hospital offers its patients individual and group psychotherapy, psychopharmacological therapy, behavioral therapy, and psychodrama in addition to the therapeutic atmosphere of the residential units and a variety of adjunctive therapy programs.

The hospital, begun by Dr. Robert S. Carroll in the early part of the twentieth century, was given to Duke University Medical Center in 1939 and made an integral part of the Department of Psychiatry in 1967. All full-time psychiatrists, psychologists, and social workers at the hospital hold academic appointments at Duke.

North Carolina Cerebral Palsy Hospital

The N. C. Cerebral Palsy Hospital in Durham is a residential rehabilitation center for children with neuromuscular and skeletal diseases, primarily cerebral palsy. It is operated by the state but staffed by physicians from the Duke University Medical Center.

The hospital, with 40 beds, offers a complete rehabilitation department and nursery, elementary, and secondary classes for its patients.

Sealevel Hospital

Sealevel Hospital in Carteret County, N. C., became part of Duke University Medical Center in early 1969 as result of a gift by D. E. Taylor of West Palm Beach, Florida, his father, and brothers. The 90-bed community hospital retains its professional and administrative staff while representatives of the Medical Center and the University serve in a program advisory and general management capacity.

Exchange visits between Sealevel and Duke physicians and possible elective rotations at Sealevel for Duke medical students are under consideration.

Veterans Administration Hospital

The Durham Veterans Administration Hospital is located within walking distance of the School of Medicine. The full-time professional staff are

all members of the faculty of Duke University School of Medicine. This 489-bed general hospital provides an opportunity for closely integrated student teaching and house staff training, and admits nearly 7,000 patients annually.

Audiovisual Education

The Division of Audiovisual Education is structured to serve the Medical Center in three ways: (1) to produce all types of audiovisual materials; (2) to inform the faculty and students concerning audiovisual materials and methods; and (3) to provide indirect and direct assistance to the faculty who wish to use audiovisual media in their teaching, research, and patient care endeavors. There are three subdivisions: the Medical Art Facility, the Medical Photography Facility, and the Central Television Facility.

The Medical Art Facility provides illustrations produced by various art methods and techniques of subjects seen or unseen and theoretical. Services rendered include: medical illustrations, schematic and mechanical drawings, diagrams, charts, graphs, designs, lettering, signs, casts, models and exhibits, and other forms of illustrations. The production of facial prostheses and instruction in the use of opaque cosmetics are performed by the Facial Prosthetics Laboratory, a subsection of Medical Art.

The Medical Photography Facility is staffed and equipped to provide all photographs needed for teaching, research, and in the diagnosis and treatment of patients. For example, photographs of patients may include such fine details as the patterns of vessels on the retina, or those of the skin as they are revealed by infrared light. Photographs are used by the medical staff as records of the patients' responses to treatment, as well as in teaching. Surgical and other procedures are recorded in motion pictures to be used for instruction and to enhance the patient's records.

The Central Television Facility provides service directed toward the instruction, research, and patient care programs of the Medical Center. The television system is designed to enhance the multimedia approach for instruction. During the past several years, a collection of videotaped material has been produced as cores for teaching presentations. The television control center is capable of interdigitation of all audio and video signals originating from TV cameras, a motion picture-opaque-slide pick-up device, and video tape recorders. Studio and mobile cameras, monitors, and the wide-screen TV projector may be used in twenty-eight specific locations throughout the Medical Center. These locations include all major classrooms and student laboratories.

Although no formalized study in medical art, medical photography, and medical television is provided, individual training programs are available for those who wish to pursue a career in the medical audio-visual field. Director S. Agnello, E. Clark, W. Williams, M. Wayda.



Student Life

Living Accommodations

Housing

Duke University provides living accommodations for graduate-level resident students, both married and unmarried.

Rooms in residence halls, spaces in Town House Apartments, or other rental units may be reserved by single applicants only if they have been accepted by the Medical School and after the required \$25 room or security deposit has been paid to the Duke University Bursar.

Assignment priority is established by the date of receipt of completed applications with deposits in the Department of Housing Management.

Residence Hall space available for single graduate and professional students totals 197 beds for men and 97 beds for women. Facilities for single graduate and professional students are located on the northern side of the campus near the Medical Center.

Town House Apartments, located between East and West campuses, include 30 two-bedroom units, each furnished for three graduate women students. Two students occupy the master bedroom, the third occupies a small bedroom. A living room, kitchen, and one and a half baths complete these attractive living units.

The University now leases a number of two- and three-bedroom apartment units for use by married graduate and professional students. As

compared with similar apartment properties in the Durham area, rental of the Duke-leased units provides financial advantage to most students accepting leases through the University Department of Housing.

Regulations governing room and security deposits and occupancy of rooms and apartments will be provided by the Department of Housing Management at the time application forms are forwarded to accepted students. Occupants within each type of housing are expected to comply with the appropriate regulations.

Application forms and detailed information on graduate housing will be mailed when the Graduate School has notified the Department of Housing Management of official acceptance of the student. Single women may express a choice for the type of housing desired. Completed applications for rooms and apartments are to be returned, with required deposits, to the Department of Housing Management, Duke Station, Duke University, Durham, North Carolina 27706.

All requests for rates and other information for apartment type accommodations should be addressed to the Director of Housing Management, Duke University. Specific information will be supplied.

Dining Facilities

Several dining facilities, located near the Medical Center, are available to students in the School of Medicine.

In the Duke University Union Building, there are two cafeterias offering multiple-choice menus and a dining area, the Oak Room, which offers full meals and *à la carte* items.

In the Men's Graduate Center, there is another cafeteria with multiple-choice menus and the coffee lounge, where sodas and sandwiches are served from 11:30 A.M. to 11:00 P.M. (See section on Dining Facilities in the chapter on Financial Information for approximate food costs.)

Services Available

Student Personal Advisory Program

The development of an informal and cordial student-faculty relationship is an important objective of the Duke University School of Medicine. As a means of achieving this objective, the Student Personal Advisory Program was established.

The Student Personal Advisory Program provides each medical student, from the time he enters as a freshman until the time he graduates as a physician, with a single faculty member whose special interest he becomes. Each student joins with four others in constituting a group for which their "personal" faculty adviser has responsibility.

Through informal meetings, discussions, and occasional social gatherings, an atmosphere of mutual confidence and friendliness becomes established, a relationship that often extends beyond graduation and reaches far into the future.

Student Medical Care

With the exceptions to be noted, full medical, psychiatric, and surgical care is furnished to all regularly matriculated medical students of the University while they are on the University campus if they have paid the quarterly general fee. This service is under the direction of the physician-in-charge with the cooperation of the staff of the Duke University Medical Center. It includes hospitalization (limited to thirty days), professional care, drugs, dressings, X-ray studies, and ward but not special nursing. A charge for board is made at the same rate as in the University dining halls. Refraction of eyes and treatment of teeth and of all chronic and pre-existing conditions, such as diseased tonsils, hernia, elective surgery, chronic skin conditions, and endocrine disturbances, or accidents or illnesses occurring during vacations or while off the campus are not included in this service. The cost of any necessary braces and orthopaedic appliances, as well as of special nursing, must be borne by the patient. If the student has insurance providing hospitalization, surgical, or medical benefits, these benefits may be applied to the cost of his medical care.

In recognition of the unique health needs of medical students, whose activities bring them into far greater contact with communicable disease than the average university student, a special health program for medical students has been established. The program will provide for a careful physical examination, chest X-ray, blood and urine examination, and necessary immunizations at the beginning of the freshman year. In addition, chest X-rays will be repeated at appropriate intervals during the entire four years of medical school.

Since these services are in addition to those available through the Student Health Service, a special fee of \$25.00 will be required of each medical student to cover the extra cost over the four-year period. R. Portwood, Director of Student Health.

Student and Professional Organizations

Davison Society

The Davison Society is a composite of the former Student Government Association and the local chapter of the Student American Medical Association. All students in the medical center working toward the

degree of Doctor of Medicine are members of the society, with membership in SAMA being optional. The Davison Society Council consists of twenty-five elected students including an executive council and individual class officers. The responsibilities of the society include freshman orientation; publication of the yearbook for the Medical Center, a directory of students, and a listing of research opportunities for medical students; participation in the Davison Scholar Program; organizing extracurricular educational and social events; and serving as liaison between students and faculty. With the curriculum change at Duke the society has worked responsibly with the faculty in curriculum planning and evaluation.

Recently students and faculty worked together to change the grading system to a pass-fail honors system with written evaluations. The philosophy behind the change is that medical students preparing for a life of professional study need to develop independent learning habits and not study for grades. Also written evaluations which are objective, frank, and comprehensive will provide students with better feedback and more useful data for their development as physicians than did simple letter grades.

Students have also become active in community health affairs in these times when medical schools are exploring their responsibilities to the communities in which they are situated. Examples of such activities are the Edgemont Community Clinic, which is purely a student-community run medical clinic in one of the poverty areas of Durham, and the sex education program, which is a group of some thirty students who designed and are teaching a sex education lecture series for Durham junior high schools.

A major responsibility of the Davison Society is the preservation of the Honor Code which has been a proud tradition at Duke University School of Medicine for many years. The prevailing opinion has been that students must act with integrity while in medical school in order to cope with the much greater demands and responsibilities of the practice of medicine. Each student on or before entering Duke University School of Medicine is required to sign a statement expressing his understanding and familiarity with the honor system and his willingness to abide by its provisions. The Davison Society serves as an Honor Council to try any infringements of the Honor Code. The Dean's committee of students, faculty, and administration serves to recommend the disposition of a student found guilty by the Honor Council.

Since the merger between the Student Government Association and SAMA to form the Davison Society, the local activities of the Duke SAMA chapter no longer constitute a separate program of events. Approximately 75 percent of the medical student body holds membership in SAMA which is an independent national organization representing the

opinions and desires of more than 60,000 medical students, interns, and residents throughout the country.

Local SAMA members represent Duke University School of Medicine at regional and national meetings and conventions. A summer externship program for medical students is administered by appointed members of the Duke chapter.

The organization has earned a reputation on the national level for its interest in medical education, the delivery of health care, international foreign medical student exchange programs, hospital employment, internship evaluation, and its call for reforms in many outdated aspects of American medicine. SAMA provides benefit plans for students and maintains communication with other national student professional organizations.

The Duke Chapter has always been very active in the national organizations with a long list of committee chairmen, standing committeemen, and *ad hoc* committee members.

Alpha Omega Alpha

Alpha Omega Alpha Honorary Medical Fraternity was organized nationally in 1902, and the Duke chapter (North Carolina Alpha) was chartered in 1931. The aims of the society are the promotion of scholarship and research in medical schools, the encouragement of high standards of character and conduct among students and graduates, and the recognition of high attainment in medical science, practice, and related fields. Student members are elected from among those whose scholastic achievement places them in the upper 25 percent of the class and who have further demonstrated leadership and promise of future achievement. Not more than one-sixth of any class shall be elected to membership, and of these only one-third may be elected in the junior year. Alumni, faculty, and honorary membership may also be conferred upon certain physicians who have distinguished themselves in the various areas of medical teaching, research, and practice.

The Engel Society

The Engel Society is an organization composed of a small group of medical students and faculty which has as its principal objective the promotion of the exchange of ideas and experiences between students and faculty. The society is named for the late Dr. Frank L. Engel, who devoted much of his professional life to teaching and to helping medical students at Duke find their own niche in professional life. Six dinner meetings are held each academic year. These meetings provide a forum for informal discussion, among the members and invited guests, of issues related to medicine as science, art, and social institution. The student

membership consists of six members of the junior and six members of the senior medical classes. Each year six members of the rising junior class are invited to replace the six graduating seniors. Students chosen for membership possess not only the capability but the desire for scholarship and service in medicine in its broadest sense.

Ganglion

Ganglion, the Neuroscience Society of Duke Medical School, is one of the youngest of Duke's medical societies. Its purpose is to bring together medical students interested in neuroscience as a career. Its members have interests in psychiatry, neurology, neurosurgery, and allied areas. Ganglion was created by a small group of students to provide a means of contact with members of Duke's neuroscience faculty and with major figures in the field of neuroscience. Guest speakers are invited to at least six of the society's dinner meetings each year, and discussions center not only around guest's scientific interests but also their personal philosophies, opinions, and ideas outside of science.

Duke University Medical Alumni

The Duke Medical Alumni now number over 4,800. Membership includes all graduates of the Medical School, past and present faculty, and all past and present house-officers of Duke Hospital (including those who are not Duke graduates). Associate membership is held by alumni of the following: Hospital Administration, Dietetics, Social Service, Laboratory Technique, X-ray Technology, Physical and Occupational Therapy, Medical Record Library, and Medical Art and Illustration.

Officers

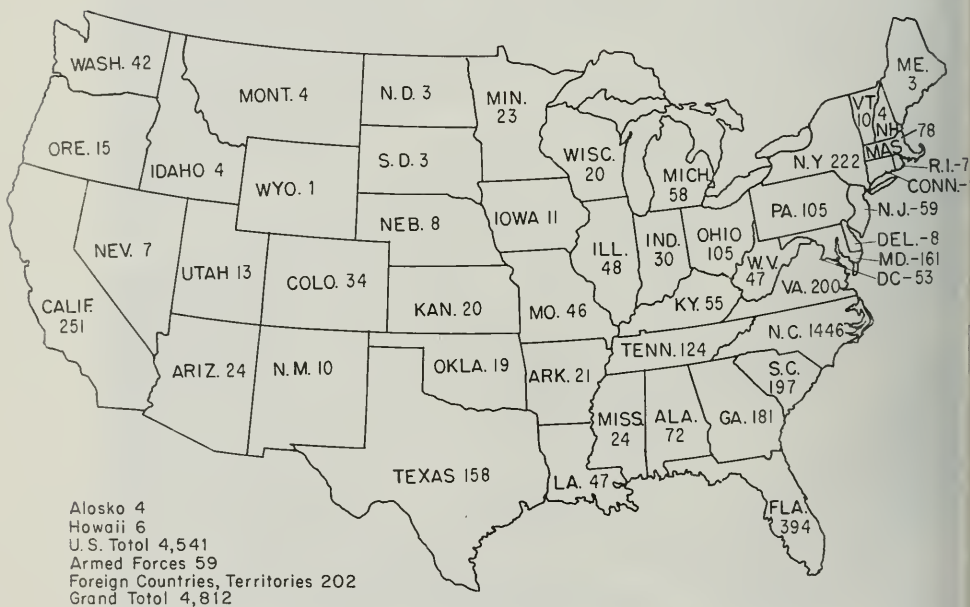
President:	Benjamin Vatz, M.D. '45 1106 Hammel Road Greensboro, North Carolina 27408
Vice-President:	Glenn C. Newman, M.D. '39 405 Cooper Drive Clinton, North Carolina 28328
Secretary-Treasurer:	Jay M. Arena, M.D. '32 1403 Woodburn Road Durham, North Carolina 27705

A newsletter is sent to all the members in January, April, July, and October of each year. Reunions are held every year in Durham; the next is planned for November, 1970. Alumni groups have been formed in several states. Alumni luncheons or dinners are held during the following meetings: the American Medical Association, the Southern Medical

Association, the North Carolina Medical Society, and the American Academy of Pediatrics.

The map shows states in which Duke medical alumni are located and the number in each state. Figures include those who received the M.D. degree from Duke and also those who have served a year or more on the house staff. A total of 4,551 physicians are distributed throughout the United States.

There are also 202 Duke medical alumni serving in the territories of the United States and in foreign countries, and 59 alumni are on duty in the Armed Forces.



Conduct of Students

Duke University expects and will require of all its students continuing loyal cooperation in developing and maintaining high standards of scholarship and conduct.

The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University as currently in effect, or from time to time, are put into effect by the appropriate authorities of the University.

Any student, in accepting admission, indicates his willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate, for failure to abide by such rules and regulations or for conduct adjudged unsatisfactory or detrimental to the University.



Financial Information

Fees and Expenses

Tuition

The following table represents an estimate of a student's necessary expenses for the normal academic year of the School of Medicine. The total of these figures suggests a basic minimum budget of approximately \$3,000. Allowances for recreation, travel, clothing, and other miscellaneous items must be added to this estimate. These, of course, will vary considerably, depending upon the needs and tastes of the individual.

Tuition	\$2050.00
Board (Cafeteria estimate)	625.00
Room*	325.00—495.00
Books†	90.00—275.00
Medical Student Health Program‡	25.00

*University Housing.

†Anticipated annual cost of books: first year, \$275; second year, \$135; third and fourth years, \$90.

‡For details of this program, see page 24.

Instruments and insurance*	197.50
Student Government (Davison Society) Subscriptions†	15.00

There are four dates in each academic year when approximately one-quarter of the total annual tuition becomes payable. These dates apply irrespective of whether a student is in the first year (2 semesters), on 7-week terms, or 9-week terms. The dates for the academic year 1970-71 are Friday, September 4, 1970; Friday, November 13, 1970; Friday, February 5, 1971; and Friday, April 2, 1971. An additional billing payable by Friday, May 28, 1971, will be made to those who elect to attend the summer term.

The Office of the Bursar will send bills as a reminder of the exact amount payable to the University. A late fee of \$10.00 will be assessed for any portion of the tuition and other charges that remains unpaid and for which prior arrangements have not been made with the Bursar's Office. If a student who has paid a billing should drop out of school, he will not be due a refund. No credit will be given for any term in which the tuition has not been paid, whether the work has been at Duke or elsewhere. A student is not eligible to attend classes or to make use of University facilities if he is in default of payment of monies owed the University. Nonreceipt of a bill does not exonerate the student from payment or from assessment of the late fee.

It is not advisable for students to attempt outside work to defray their expenses during the academic year.‡

Housing

Rooms in residence halls are normally rented for the academic year, but for no period less than one semester or specified term. The limited number of single rooms are usually reserved for returning students.

Each student assigned to the Town House Apartments is currently charged \$495.00 for the academic year on the basis of three individuals to an apartment. Utility charges are included in these rates. Rental rates for space in double residence hall rooms range from \$325 to \$355 for the academic year.

Current rates for apartment-type units for married students range from \$135 per month for an unfurnished 2-bedroom unit to \$160 per month for a three bedroom unit. Rates for these units are subject to change. De-

*Microscope, sphygmomanometer, ophthalmoscope, otoscope, and other equipment which are required of each student and which must conform to rigid standards may be purchased from the University by means of a Student Equipment Time Payment Plan.

†Mandatory fee.

‡Wives of medical students desiring employment may secure information from the Duke Medical Center Personnel Office or the Duke University Personnel Office.

tailed information will be furnished by the Department of Housing Management on request.

No refund on residence hall room rent or the rent for spaces in Town House Apartments is made to students who withdraw after the date of registration, except for those who involuntarily withdraw to enter the armed services. Such refunds will be made in accordance with the University's established schedules.

Married students who desire assignment to apartments will be offered leases for specific periods. Cancellation procedures are stipulated in the agreements.

Applications

Students officially accepted for admission to the School of Medicine will be requested to complete a housing information form to be returned to the Director of Admissions, Duke University School of Medicine, Durham, North Carolina.

On receipt of the completed forms, students will be sent appropriate literature, housing application forms, and instructions. The completed housing application forms and required \$25 deposits must then be sent to the Director of Housing Management, Duke University, Durham, North Carolina. Confirmation of room and apartment assignments will be forwarded to the applicants as soon as practical, usually about one month before occupancy. (See section on Housing Deposit and Refund on page 33).

Residence Hall and Town House Apartment Regulations

Rooms and apartments are rented for the academic year. Room and apartment rentals for less than one term require special arrangements.

A resident student in order to retain his room or apartment for the succeeding academic year must make application at the Department of Housing Management for confirmation of his reservation.

No refund of room or apartment rent for a specified medical term will be made after the day of registration for that term except for students who involuntarily withdraw to enter the armed services. Such refunds will be made in accordance with the University's established schedule. Students desiring to cancel a residence hall reservation must provide written notice to the Department of Housing Management by August 1 for cancellation of a reservation for the fall semester and not later than ten days prior to the beginning of any subsequent medical term for a cancellation of a reservation for the next medical term. Such notice is essential to obtain refund of both room rent and the \$25 room deposit. Refer to the Medical School Calendar for details on dates of specified terms for each class.

The authorities of the University do not assume responsibility for

persons selected as roommates, and each student is urged to select his roommate when reserving a room or apartment. Any student who occupies a double room without a roommate will be given written notice from the Department of Housing Management to obtain a roommate or he may be required to pay the rental consideration for the whole room or apartment. Similar notification will be sent to occupants of apartments where vacancies occur.

Regulations governing the occupancy of rooms or apartments will be supplied by the Department of Housing Management to those students who make application for housing. Occupants are expected to abide by these regulations.

Any exchange of rooms or apartments must be made at the Department of Housing Management. Persons who exchange rooms or apartments without the approval of the Department of Housing Management will be subject to the charge for both apartment spaces.

Housing Deposit and Refund. A \$25 deposit is required of each applicant before a housing reservation is made. This initial deposit serves as a continuing deposit for successive terms.

Refunds. The room deposit will be refunded under the following conditions:

1. Within thirty days after the student has been graduated.
2. Upon withdrawal from the University residence halls by students enrolled on the semester basis, provided written notice is received by the Department of Housing Management by August 1, for cancellation of a reservation for the fall semester, and not later than January 15, for the spring semester.
3. Upon withdrawal from the University residence halls by students enrolled on the basis of the medical term, provided written notice is received by the Department of Housing Management by August 1, for cancellation of a reservation for the term beginning in September, and not later than ten (10) days prior to the beginning of any subsequent medical term within the academic year.

The deposit required for apartments operated by Duke University is refunded under similar circumstances; however, apartments are rented on a lease basis.

No refund will be made until the occupant has checked out of his room or apartment through the Department of Housing Management and has settled his account with the Bursar.

Dining Facilities

If a student dines on the Duke University campuses, the cost of food for the academic year will average approximately \$625.00; however, this will vary depending upon the tastes of the individual.

The prices of food are the same in each of the University-operated dining facilities.

Motor Vehicle Registration

Each motor vehicle operated on the Duke University campuses by students enrolled in the School of Medicine must be registered at 08 Social Science Building within five calendar days after operation on the campuses begins, and thereafter must display the proper registration emblem.

Resident students must pay an annual parking fee of \$30.00 for each motor vehicle or \$10.00 for each motorcycle, motorbike, or motor scooter.

To register a vehicle, the student must present the following documents: (1) state vehicle registration certificate; (2) valid driver's license; and (3) satisfactory evidence of automobile liability insurance as required by North Carolina law—\$10,000 per person, \$20,000 per accident for personal injuries, and \$5,000 property damage.

Parking, traffic, and safety regulations will be given each student who registers his vehicle. Students are expected to abide by these regulations.

Financial Aid

The Duke University School of Medicine makes financial assistance available to accepted students who, due to financial circumstances, could not otherwise attend the University. Scholarships are assigned according to regulations which govern the particular scholarship. Most scholarship funds are awarded on the basis of merit and financial need. Other funds specify financial need as the only criteria for assignment. Loans are assigned solely on the basis of financial need.

Financial Assistance to Incoming Freshmen

Those students who are accepted and who have indicated in their original application a need for financial aid will be sent a separate application along with the letter of acceptance by the School of Medicine.

Financial Assistance to Upperclassmen

Upperclassmen seeking financial assistance for the first time should consult with the Coordinator of Medical Students Loans and Scholarships and obtain an application through that Office.

Scholarships—Fellowships

Where not stated, specific information concerning these may be obtained from the Office of the Coordinator of Medical Student Loans and Scholarships.

The *Avalon Foundation Scholarships* are non-refundable grants assigned on the basis of financial need and scholastic attainment.

The *Mary Duke Biddle Foundation Scholarships* are awarded to academically distinguished medical students who need financial assistance. A scholarship may cover up to full tuition costs.

The *Thomas C. Bost Foundation Scholarship* is assigned on the basis of merit and need in an amount equal to tuition.

The *Dr. John H. Lane Memorial Scholarships* are granted to medical students on the basis of financial need.

The *Medical Faculty Wives Scholarship* is awarded to a worthy student for four years in the amount of tuition.

Medical Historian Traineeships. See Section entitled Combined M.D.-Ph.D. Training Programs.

Medical Scientist Traineeships. See Section entitled Combined M.D.-Ph.D. Training Programs.

The *Pfizer Scholarship*, offered by the Pfizer Laboratories, a division of the Charles Pfizer & Co., Inc. is an award of \$1000 granted to a student selected on the basis of merit and need.

The *Sigmund Sternberger Scholarships* are awarded in the amount of \$1,000 each to five medical students every year. Entering freshmen recipients receive the award for four years. Upperclassmen receive one-year awards. Preference in assignment is given to North Carolina residents who intend to remain in the state to practice medicine.

The *Charles Alva Strickland Memorial Fund Scholarships* may cover up to full tuition costs. This scholarship is renewed for each year after the first year. Merit and need are taken into consideration of assigning this scholarship.

The *Francis and Elizabeth Swett Scholarships* are awarded to entering students on the basis of outstanding need and merit. The scholarships are awarded on a one year basis, renewable if funds permit or if need still exists and academic excellence is maintained.

U. S. Public Health Scholarships are available to U. S. citizens who cannot pursue the required studies without such aid. Demonstrated financial need is required in order to be considered for this scholarship. The maximum scholarship is \$2500.

The *Dr. Hillory M. Wilder Scholarship Fund* covers full tuition for each of four years and is awarded on the basis of merit and need.

Student Awards and Research Fellowships

Student Research Fellowships are available as part of a program

designed to encourage the medical student to participate in research. Summer fellowships carry a stipend of \$200.00 per month. These fellowships enable selected students, after completion of their first year, to participate in research during a summer vacation or other free time. Special fellowships in nutrition, ophthalmology, allergy, and other fields are also available. Opportunities also exist for a student to engage in research for an entire year during which time he temporarily discontinues his medical course. These post-sophomore research fellowships carry a stipend of \$3,200 per year plus an allowance for dependents and tuition expenses. In special circumstances these fellowships are tenable at institutions other than Duke Medical Center and outside the United States. Information may be obtained from the Associate Director for Undergraduate Medical Education.

The Wilbur C. Davison Scholarship Award. This award was instituted to enable a medical student to widen his experience through clinical study outside of the United States. One award of \$500 is made each year. Information may be obtained from the Associate Director for Undergraduate Medical Education.

The Trent Prize in the History of Medicine. The Trent Prize was established by Mrs. Mary Trent Semans in memory of the late Dr. Josiah C. Trent to encourage students to undertake independent work in the history of medicine and to utilize the resources of the Trent Collection.

An annual award of \$100.00 is offered for the best essay by a Duke medical student on any topic in the history of medical and allied sciences. An additional book award will be made to each entry of merit. Students are invited to discuss possible topics with the Curators of the Trent Collection. Finished papers must be submitted to Mr. G. S. T. Cavanagh, Medical Center Library, by October 31 of each year.

Lange Medical Publications Awards. Textbooks and certificates are awarded to the Senior Class Valedictorian and the top ranking woman graduate. Textbooks are also awarded to the top two students in each of the upper three classes and to the president and representatives of the first year class.

C. V. Mosby Awards. Gift certificates for the purchase of books are awarded annually to five top students in the graduating class.

American Medical Women's Association Awards. An award of \$100.00 and a citation are presented to the woman medical student who graduates at the top of her class. An Honorable Mention citation is presented to all women students who graduate within the top ten per cent of their class.

Smith Kline & French Award for Medical Writing. An award of \$100.00 is made annually to the medical student who submits the most meritorious essay describing a piece of research. The paper must show that particular attention has been given to clarity of writing, definition of objectives, presentation of results, and bibliography in correct form.

Papers must be submitted to the Associate Director for Undergraduate Medical Education before November 30 of each year.

Merck Manual Awards. A copy of the *Merck Manual* is presented annually to past presidents of the Student Government Association and the Duke Chapter of the Student American Medical Association to recognize their contribution to the life of medical students at Duke University School of Medicine.

Roche Award. A gold engraved wrist watch and certificate is presented annually to the graduating senior who has achieved the highest academic performance throughout four years of medical school at Duke University School of Medicine.

Roche Medical Book Program. Each member of the senior class is sent a certificate that permits him to receive a medical textbook of his selection.

Duke University School of Medicine Awards. The past presidents of the Student Government Association and the Duke chapter of the Student American Medical Association receive a book award in recognition of their contributions to student life.

The Thomas Jefferson Award. This award is made periodically to recognize outstanding achievement in fields outside those of medicine and science. The purpose is to identify individuals who have a broad range of talents and who have contributed materially to the life of the University as a whole.

The Upjohn Award in Community Medicine. This is an award of \$200.00 given to a Duke student for the best essay discussing some aspect of the social, cultural, economic, and other parameters of health. The paper should incorporate personal experiences. There is no limitation on length. Applicants should submit their papers by November 30 of each year to Dr. William DeMaria or Dr. E. Croft Long.

Admission

Intelligence, character, and integrity are the essential qualifications for admission.

A premedical student should be aware of the importance of a well-rounded general education as a preparation for the study of medicine and not limit himself to scientific courses. The Admissions Committee believes that the manner in which the college years are utilized is of greater importance than the specific subjects taken. The premedical student would be better advised to secure a knowledge of the principles and a thorough appreciation of the interrelations of the basic sciences than to accumulate credits in many courses. He should learn how to work independently, to observe critically, and to analyze rather than merely to store the information presented. Good study habits and use of time are perhaps the most important tools a student can bring to the study of medicine. His choice of studies beyond those required for admission should be governed by his own chief interests and by the intellectual stimulus to be derived from the work.

Application for Admission

Application forms may be obtained by writing to the Committee on Admissions, Box 3710, Duke Hospital, Durham, N. C. 27706. Requests for application materials will be accepted after March 1. Formal applications will be accepted by the Committee on Admissions only between August 1 and December 1.

Requirements for Admission

A minimum of ninety semester hours of approved college credit is necessary for admission to the School of Medicine. These must include:

- One year of college English which must consist primarily of expository English composition.
- One year of inorganic chemistry.
- One year of organic chemistry.
- One year of physics.
- One year of biology and/or zoology.
- One year of calculus.

All science requirements must be completed not more than seven years prior to entrance.

Medical College Admission Test is required of all applicants. It is administered by the Psychological Corporation, 304 E. 45th St., New York, New York. This test is given at many of the colleges throughout the country in May and October of each year. Arrangements for taking this test should be made by the student through his premedical adviser. It is recommended that applicants perform this test in May of the year they plan to fill out applications.

Selection

Selection is made between September 15 and March 15 for the student entering the following September. The data on each candidate are carefully screened by the Committee on Admissions. A personal interview will be arranged for those with satisfactory credentials. If the distance from Durham is permissible the interview is conducted here; otherwise candidates are referred to our Regional Representatives. Many factors are evaluated by the committee in the selection process. Those students who show the most promise for exceptional performance in their future practice of medicine are admitted. The candidate is notified as soon as possible whether or not he has been accepted. If he has been accepted, it is necessary for him to send a deposit of \$50 within three weeks of notification in order to ensure enrollment. This deposit is applied toward tuition and is refundable upon withdrawal prior to March 1. Inasmuch as admission must be offered a considerable period in advance of matriculation, the admission must be provisional upon the successful completion of the remaining college work.

Applications for Transfer

Applicants who have completed two years in most of the American and Canadian schools will be considered for transfer only as space permits. Such transfer students would be required to complete the second and fourth year of our curriculum. For transfer, successful completion of Part I of the National Board Examination is required as evidence of satisfactory accomplishment in the subjects taught in the first two years of most North American schools.

A limited number of transfer students from foreign medical schools may be admitted each year. Such students should have completed their preclinical training and will be required to take Part I of the National Board Examination. If space permits, these students will be admitted to our sophomore clinical rotation and be required to complete the junior and senior years, composed of electives in the clinical and preclinical areas. By attending two summer sessions a transfer student from a foreign medical school can earn his M.D. degree from Duke University approximately two and one half years after matriculation.

Requests for transfer application materials must be made by January 15 of the year of anticipated transfer. The deadline for the receipt of completed applications is March 15 of the same year. Competitive applicants will be sponsored for Part I of the National Board Examinations to be given in June of that year as part of the evaluation procedure. Upon receipt of the results of this examination, personal interviews will be arranged for those with satisfactory credentials.

Transfers into the freshman or senior year are not permitted.

Advanced Placement for Entering Freshman

Advanced placement will be offered on an optional basis to qualified students for the following first semester courses: anatomy, biochemistry, and physiology and genetics. Those students who wish to be considered for advanced placement must take examinations in these subjects for which they want consideration. These examinations will be scheduled during the first week of medical school. Students who are granted and accept advanced placement for a given course will not have to take that first semester course. However, they will be responsible to the departmental chairman and will have to work out mutually agreeable substitute activities.

Students who have successfully completed the Ph.D. in the biomedical or preclinical sciences may apply for a three-year program leading to the M.D. degree, consisting of the freshman "core" year followed by the sophomore clinical rotation and senior clinical electives.

Summary for Applicants

Years of College work required	Three
Nonrefundable application fee	10.00
Deposit required within three weeks of notification of acceptance	50.00
Medical College Admission Test required	Yes
Size of 1970-71 first year class	104
File application for admission between	August 1, 1970 December 1, 1970
Notification of action on application between	October 1, 1970 March 15, 1971
Date entering class starts school	September 7, 1971

Regional Representatives of the Committee on Admissions

Alabama: *Birmingham*, Ben V. Branscomb

Alaska: *Anchorage*, Milo H. Fritz

Arizona: *Phoenix*, Stanley Karansky

Arkansas: *Little Rock*, Rosalind Smith Abernathy

California: *Berkeley*, H. I. Harvey; *Davis*, Robert S. Stempf, Jr.; *Los Angeles*, Joseph A. Conroy, Douglas F. Smiley; *Menlo Park*, Gustave Freeman; *Palo Alto*, Leon Cohen, James B. Golden; *Pasadena*, Robert H. Pudenz; *San Francisco*, John E. Cann, R. Gray Patton; *San Mateo*, Lester H. Margolis; *West Covina*, Jeremiah W. Kerner; *West Los Angeles*, James L. Scott

Canada: *Montreal*, J. E. Gibbons; *Toronto*, John B. Armstrong

Colorado: *Denver*, F. Vernon Altvater, Howard T. Horsley, Jr., John Ray Pryor, Fred W. Schoonmaker

Connecticut: *Hartford*, William H. Glass; *New Haven*, Clarence D. Davis, Saul A. Frankel, Joseph Mignone, Ned M. Shutkin, *Old Saybrook*, John R. Egan

District of Columbia: Louis Spekter

Florida: *Gainesville*, Lamar Roberts, Joseph W. Shands, Jr.; *Jacksonville*, David W. Brooks, Jr.; *Lakeland*, Charles Larsen, Jr., John Verner, Jr.; *Miami*, James J. Hutson, David H. Reynolds; *South Miami*, Stanley J. Cannon; *St. Petersburg*, David S. Hubbell; *Tampa*, Richard G. Connor

Georgia: *Atlanta*, James C. Crutcher, E. B. Dunlap

Germany: *Berlin*, Otto H. Gauer

Hawaii: *Honolulu*, Richard K. Blaisdell, James G. Harrison, Jr.

Idaho: *Boise*, William L. Venning; *Idaho Falls*, Reid H. Anderson

Illinois: *Chicago*, Ruth K. Freinkel, George H. Gardner, Daniel J. Pachman, Theodore B. Schwartz; *Evanston*, Donald R. Mundie, Milton Weinberg, Jr.; *Monmouth*, Kenneth E. Ambrose

Indiana: *Indianapolis*, Norman H. Bell, John D. Graham, Joseph C. Ross

Iowa: *Davenport*, Alexander W. Boone; *Des Moines*, Charles W. Latchem; *Sioux City*, Havner H. Parish, Jr.

Kansas: *Kansas City*, Wilkes O. Hiatt, Jr., Ralph H. Major; *Salina*, Roy B. Coffey; *Wichita*, Thomas Jager

Kentucky: *Lexington*, Kearns R. Thompson; *Louisville*, Billy Franklin Andrews, Georga Uhde

Louisiana: *New Orleans*, Richard H. Corales, Jr., Norbert Enzer, Harold M. Horack, Richard M. Paddison, Philip H. Jones

Maine: *Portland*, E. Charles Kunkle

Maryland: *Baltimore*, John T. King, C. Edward Leach; *Towson*, William C. Battle

Massachusetts: *Boston*, Raymond D. Adams, James H. Currens, Ellison C. Pierce, Jr., James L. Tullis, R. Lewis Wright, David Michael Young, James H. Austin, Dorothy A. Elias; *Springfield*, George A. Sotirion

Michigan: *Ann Arbor*, George E. Bacon, Muriel Meyers, Donald L. Rucknagel; *Detroit*, Robert F. Kandel; *Port Huron*, William T. Davison

Minnesota: *Minneapolis*, Lewis W. Wannamaker; *Rochester*, Richard E. Symmonds

Missouri: *Columbia*, John T. Logue; *St. Louis*, Thomas B. Ferguson

Nebraska: *Beatrice*, R. Brown

New Hampshire: *Hanover*, George Margolis, R. J. Vanderlinde

New Jersey: *Montclair*, Benjamin B. Burrill; *New Brunswick*, Gordon Benson, William E. McGough

New Mexico: *Albuquerque*, Robert Proper; *Artesia*, C. Pardue Bunch

New York: *Albany*, Stuart Bondurant, Frank M. Woolsey, Jr., *Buffalo*, Oliver J. Bateman; *Endicott*, James K. Tompkins; *Hornell*, Gordon Stenhouse; *Ithaca*, John G. Maines; *Lockport*, Frank H. Crosby; *New York*, Elaine Eyster, Jules Hirsch, Eugene L. Horger, Julia M. Jones, Michael J. Lepore, J. William Littler, Richard A. Ruskin, Leonard H. Schuyler, Robert A. Shimm; *Pittsford*, Rufus S. Bynum; *Rochester*, William L. Sutton; *Syracuse*, Alfred S. Berne, Herbert Lourie, James E. Sheehy

Ohio: *Cincinnati*, Murray B. Sheldon, Jr.; *Cleveland Heights*, Robert B. Kubek; *Columbus*, Robert J. Atwell, Charles A. Doan, Lucy R. Freedy, George W. Paulson, James V. Warren; *Dayton*, Stuart R. Ducker; *Elyria*, William L. Hassler; *Toledo*, William A. Phillips

Oregon: *Portland*, Richard R. Carter, Joseph F. Paquet

Pennsylvania: *Bethlehem*, Ralph K. Shields, James G. Whildin; *Bryn Mawr*, John V. Blady; *Doylestown*, Zachary A. Simpson, *Harrisburg*, Earl S. Moyer, Alfred J. Sherman; *Johnstown*, W. Frederick Mayer;

Philadelphia, Max W. Fischbach, Doris A. Howell, Alfred M. Sellers;
Pittsburgh, H. V. Murdaugh, Jr., Jack D. Myers; *Scranton*, Louis C. Waller; *Williamsport*, William R. Brink
 Puerto Rico: *Santurce*, Kenneth B. Brown, Rafael Hernandez-Saldana
 Rhode Island: *Providence*, Richard P. Sexton
 South Carolina: *Charleston*, Edward F. Parker, J. I. Waring; *Columbia*, Ben N. Miller, James M. Timmons; *Greenville*, Raymond C. Ramage
 Tennessee: *Chattanooga*, Richard Van Fletcher; *Memphis*, William L. Byrne, Jack Greenfield, Raphael E. Semmes; *Nashville*, Walter G. Gobbel, Jr., Alexander C. McLeod, Greer Ricketson; *Sewanee*, Henry T. Kirby-Smith
 Texas: *Austin*, Francis A. Morris, Jr.; *Dallas*, Reuben H. Adams, W. Crockett Chears, Jr., A. James Gill, William Shapiro; *Fort Worth*, Henry L. Burks; *Galveston*, R. H. Rigdon; *Houston*, Elizabeth Balas Powell, H. Grant Taylor; *Midland*, Dorothy B. Wyvell; *San Antonio*, Robert H. Barnes, Royall M. Calder; *Temple*, E. Clinton Texter, Jr.
 Utah: *Salt Lake City*, Andrew Deiss
 Vermont: *Burlington*, Edward S. Horton
 Virginia: *Waynesboro*, Thomas L. Gorsuch
 Washington: *Seattle*, A. Lawrence Banks, William A. MacColl, Lois Hale Watts
 West Virginia: *Charleston*, Harold H. Kuhn
 Wisconsin: *La Crosse*, C. Norman Shealy; *Milwaukee*, Ramon L. Lange, Jack L. Teasley

Courses of Instruction

Anatomy

Professor J. D. Robertson, *Chairman*; Professors J. Buettner-Janusch, J. Everett, J. Markee, M. Moses, T. Peele; Associate Professors W. Cuyler, K. Duke, W. Longley, M. Reedy; Assistant Professors F. Bassett, M. Mahaley, S. Counce, K. Kilburn, J. Shaffland; Associates M. Cartmill, J. Richardson, J. Bergeron, J. Reynolds; Instructor V. Morgan; Visiting Lecturer, C. Doggenweiler

Required Course

The core course of instruction in human anatomy (ANA-200) will constitute about 253 hours during the first 18 weeks of the first year. The gross anatomy of the human body will be studied during the first eight weeks, histology during the first 13 weeks, and neuroanatomy during the 15th through 18th week. The gross anatomy of the back, pectoral and pelvic girdles, and the limbs will be studied during the 12th through 14th week. All of the above will be integrated with the other material studied during the first year. Emphasis will be placed upon the study of the material in the laboratory. In an attempt to utilize more fully the laboratory time, audiovisual education methods will be employed as fully as possible. These techniques will consist of color motion pictures of demonstration dissections, closed-circuit television, color lantern slides,

and motion pictures. All of the instruction is designed to be as informal and as nearly individual as possible. General principles and the functional viewpoint of living anatomy will be stressed in the hope that the student may be stimulated to secure a working knowledge of anatomy in the broadest sense. Whenever possible, fresh tissues and living cells will be made available for examination. Patients exemplifying anatomical principles will be presented, some within the classroom, others over live television, and others prerecorded on video-tape for later presentation at the appropriate time in the students' learning experience.

The introductory sequence in gross anatomy will involve several parallel modes of instruction, including tutorial sessions with individual students at the student's discretion. The gross anatomy of the entire human body, apart from the brain, will be studied through laboratory dissection carried out by the students. Formal classroom lectures will elaborate the evolutionary significance and clinical implications of the facts of human anatomy; principles of embryology and regional and systemic organization will be presented in informal lectures to small groups in the laboratory. Motion pictures, models, and prosections will also be used in the laboratory, and students will be urged to correlate their dissection with study of filmed and taped presentations available in the audiovisual facilities of the Medical Center.

In microscopic anatomy the students will be introduced to electron microscopy, polarization optical, and X-ray diffraction methods for studying problems of biological structure. The teaching will be focused on the cell, its generalized structural and functional organization to the molecular level, and its differentiation in various organs and tissues. The students will be introduced to biochemical cytology and to biophysical cytology and cytological genetics. The structure of unit membranes will be considered in detail.

In neuroanatomy the students will be introduced to neurocytology, nerve cells, and glia. The major part of the course will deal with: (a) the spinal cord, including the ascending, descending, and associative tracts; (b) the brain, brain stem, and cranial nerves three through twelve; (c) the autonomic nervous system; (d) the cerebellum, brain stem, and reticular formation; (e) the thalamus and hypothalamus; (f) the cerebral cortex, including its structure and blood supply and primary pathways; and (g) the somatic sensory and the motor systems, as well as the visual, auditory, olfactory, and limbic systems. There will also be clinical neurology with presentations of suitable patients.

The students will spend about 111 hours in gross anatomy about 78 hours in microscopic anatomy, and about 64 hours in neuroanatomy.

Elective Courses

*ANA-206(B). *Anatomy of Back and Extremities*. Complete dis-

section of back and extremities, including pectoral and pelvic girdles. Visual aids will be used extensively. Course planned for orthopaedics, general practice, or neurosurgery. Weight: 3. Term 3: Jan.-March. *Markee and Bassett*

*ANA-208(B). *Anatomy of the Trunk*. Emphasis will be on the anatomy of the thoracic, abdominal, and pelvic organs, and their blood supply, innervations, and relationships. The dissections will be augmented by use of prosections, motion pictures, and prerecorded TV presentations. Course planned for general practitioners and specialists in surgery and internal medicine. Weight: 2. Term 3: Jan.-March. *Markee and Duke*

*ANA-216(B). *Anatomy of the Head*. Course deals with: (a) the interior of the cranium and the ear, eye, and orbital contents; (b) deeper structures of the head, including the brain and its blood supply; and (c) the nasal and orbital cavities, the pharynx, and paranasal sinuses. This course is planned for general practitioners, neurosurgeons, clinical neurologists, ophthalmologists, and otolaryngologists. Visual aids will be used extensively. Weight: 2. Term 4: April-May. *Markee and Everett*

*ANA-220(B). *Dissection of Restricted Regions*. This course is designed with a special interest in gross anatomy, for example, the heart and its anatomical characteristics and relationships or in some other region. This course will be planned for the individual needs of the group of students requesting the course. Visual aids will be used extensively. Weight: 3. Term 4: April-May. *Markee and Duke*

*ANA-230(B). *Advanced Neuroanatomy of Motor Mechanisms*. The course will involve consideration of classic and modern concepts of organization of somatic and visceral motor systems. Pyramidal, extrapyramidal (including cerebellar), and limbic-hypothalamic neural mechanisms will be stressed. Weight: 2. Term 4: April-May. *Peele*

*ANA-231(B). *Physical Anthropology*. Survey of major developments of physical anthropology. Human evolution, primate phylogeny, paleontology of man and other primates, primate biochemical genetics, primate behavior, and human variation (genetic and somatic) are the principal topics of the course. Weight: 1½ per 9 weeks. Terms 1 and 2: Sept.-Jan. *Buettner-Janusch*

*ANA-232(B). *Human genetics*. Particular emphasis upon the uniqueness of studies in human genetics, human biochemical genetics, human population genetics. Weight: 1½ per 9 weeks. Terms 3 and 4: Jan.-May. *Buettner-Janusch*

*ANA-236(B). *Advanced Neuroanatomy of Sensory Mechanisms*. The course will involve consideration of classic and modern concepts of organization of somatic and special sensory systems. Thalamic and thalamocortical interrelations will be emphasized. Weight: 2. Term 3: Jan.-March. *Peele*

*ANA-238(B). *Evolutionary Biology and Medical Science*. The impact of evolutionary biology and theory on medical science and medical

research. A survey of the basic literature of evolutionary biology. Principles of taxonomy, the species concept, population structure, and population genetics are studied as they apply to problems of medicine and medical research. Weight: 3. Term 4: April-May. *Buettner-Janusch*

*ANA-244(B). *Topics in Cell Structure and Function*. Advanced discussions of selected problems such as chromosome structure, mitosis, and cytological aspects of inheritance and development. Weight: 1½ per 9 weeks. Terms 3 and 4: Jan.-May. *Moses and Nicklas*

ANA-256(B). *Surgical Neuroanatomy*. This course will utilize gross brain and spinal cord specimens, the skull, angiograms, X-rays, pneumoencephalograms, and myelograms to correlate neurosurgical diseases and procedures with regional nuclei and tracts of the nervous system. Weight: 1. Terms 1, 2, 3, and 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Mahaley*

ANA-260(B). *Developmental Systemic Anatomy*. A survey of all major systems or concentration on selected ones will be presented, depending on interests of students. Dated rat embryos, supplemented by primate material, will be used to follow the development of organ systems. Weight: 3. Term 3: Jan.-March. *Duke*

*ANA-288(B). *The Cell in Development and Heredity*. A seminar on topics of current interest and controversy in cell heredity and development. Emphasis will be placed upon events at the cellular and subcellular levels. Weight: 2. Terms 3 and 4: spring semester. *Counce and Gillham*

*ANA-340(B). *Tutorial in Advanced Anatomy*. Selected topics will be chosen for intensive reading and discussion. Topics may be chosen related to basic problems of cytology, growth and development, biophysics, endocrinological control, neuroanatomy, physiological differentiation, and evolutionary origins of functional micro-systems. Weight: 1½ per 9 weeks, 3 per 18 weeks. Terms 3 and 4: Jan.-May. *Robertson, Buettner-Janusch, Duke, Everett, Longley, Moses, Peele, and Reedy*

*ANA-354(B). *Research Techniques in Anatomy*. A preceptorial course in various research methods in anatomy. An interested student might engage in research in anthropology, electron microscopy, developmental biology, fetal physiology, and stereotactic approaches to neuroendocrinology and neuroanatomy. Approval of the student by the faculty is required. Weight: 8. Term: summer. *Buettner-Janusch, Counce, Duke, Everett, Longley, Moses, Peele, Reedy, and Robertson*

*ANA-382(B). *Topics in Developmental Biology*. A review of recent advances in the field. Special emphasis will be placed upon events at the cellular level during fertilization, morphogenesis and cell differentiation. Weight: 3 per 18 weeks. Terms 3 and 4: Jan.-May. *Counce*

*ANA-384(B). *Gross Anatomy of the Cardiovascular System*. The gross structure of the lungs, heart, and the great vessels and their significant relationships, involving closely supervised dissection, extensive use

of all visual aids and self-learning devices. Individualized learning opportunities will be achieved. Weight: 4. Term 1: Sept.-Nov. *Markee*
*ANA-386(B). *Optical Methods in Analytical Cytology*. Theory and application of biophysical techniques for investigating cell structure and function: fundamentals of optics; qualitative and quantitative analysis using ordinary, ultraviolet, phase, interference, polarization and fluorescence microscopy, transmission and scanning electron microscopy; optical, electron, and X-ray diffraction; autoradiography. Weight: 5. Terms 3 and 4: Jan.-March, March-May. *Robertson, Longley, Moses, and Reedy*

ANA-388(B). *Molecular Basis of Anatomy*. Lectures and conferences on the molecular structure of biological macromolecules and their organized aggregates such as are found in viruses, muscle, membranes, and other intracellular organelles, with emphasis on the results of electron microscopy, X-ray diffraction, and optical analysis. Weight: 4. Terms 3 and 4: Jan.-May. *Longley, Robertson, Reedy, and Moses*

ANA-390(B). *Anatomy of the Fetus*. The chief objective will be to complete a dissection of the human fetus. Emphasis will be placed upon comparing fetal and adult anatomical systems and relationships. Weight: 2. Term 4: March-May. *Duke*

*PHS-403(B). *Endocrinology and Reproduction*. Current concepts of biosynthesis, secretion, and mechanisms of action of hormones. Structural relationships and endocrine regulation at cellular, organ, and higher integrative levels. Structure and function of male and female reproduction systems including hormonal mechanisms in pregnancy and parturition. (Also listed as *ANA-403[B].) Weight: 1½ per 9 weeks. Terms 3 and 4: Jan.-May. *Fellows, Everett, and Anderson*

Behavioral Sciences Study Program

The Behavioral Sciences Study Program (BSP-201B) is designed to enable a student to obtain an understanding of the basic processes underlying human behavior. This will involve a year long intensive experience designed to familiarize the medical student with significant issues in the behavioral sciences and the methodology used to investigate such issues. An extensive period of study with one of the faculty will be an important component.

The Behavioral Sciences Study Program will also enable the student to obtain an understanding of the characteristics of group and community activity. To enable the student electing a behavioral sciences program to have an intensive and meaningful experience, he will be asked to focus on one of two major subdivisions. One such subdivision will be concentrated on processes which take place primarily within the individual organism.

The faculty of this subgroup is oriented toward biological and experimental psychology including central nervous system effects on behavior, ANS response to stress and behavioral correlates, and learning and conditioning as well as perception and ethnology.

For those students wishing to focus their interests on interpersonal or group behavior, a second subdivision will include studies of personality and motivation, family structure, small group behavior, and community and social organization, including population and demographic studies. Students' activities will be in three major areas: (1) a weekly seminar with a limited number of faculty; (2) an individual tutorial, each student to work with a faculty person in laboratory or library investigation; and (3) up to two graduate or medical school courses may be undertaken as determined by the student and his preceptor. Weight: 9 per 9 weeks. Terms 1, 2, 3, and 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Eisdorfer, Feather, and Back*

Biochemistry

Professor R. Hill, *Chairman*; Professors M. Bernheim, S. Gross, W. Guild, P. Handler,* H. Kamin, K. McCarty, C. Tanford, S. Wakil; Associate Professors S. Appel, I. Fridovich, J. Harris, B. Kaufman, N. Kirshner, W. Lynn; Assistant Professors R. Greene, D. Hall, P. Harriman, J. Joshi, W. Kelley, N. Kredich, K. V. Rajagopalan, D. Richardson, H. Sage, L. Siegel, R. Turkington, R. Wheat; Associates R. Habig, Y. Nozaki, J. Reynolds *Technical Associate* L. Daniels; *Fellows* K. Anderson, I Björk, D. Calbreath, F. Castellino, A. Daniel, J. Dawson, H. Evans, R. Ferris, W. Fish, R. Green, C. Hall, W. Hatfield, R. Huxtable, V. Joshi, M. Kanda, B. Keele, A. Kirshner, K. Mann, P. Mattock, W. Moo-Penn, E. Scheer, H. Schulz, J. Sullivan, I. Trayer, K. Wong

Required Course

The required course in biochemistry (BCH M241) for first year students is given over a period of 18 weeks in the first term.

Emphasis is given to the relationships between the structure and function of the major classes of macromolecules in living systems, including proteins, carbohydrates, lipids, and nucleic acids. The metabolic interrelationships among the major cellular constituents is discussed, with emphasis on the known metabolic control mechanisms. An introduction to the biochemical basis of human disease is provided in a series of biochemical-clinical correlation lectures on such diseases as sickle-cell anemia, the glycogen storage diseases, gout, phenylketonuria, galactosemia, diabetes, and neoplasia.

The required course in genetics (BCH 204) for first year students is

*On leave of absence.

given over a period of 14 weeks in the first term. The course emphasizes fundamental properties of gene function, recombination, selection, organization, and structure. Examples from human and medical genetics are introduced to the maximum extent consistent with conveying basic concepts necessary for an appreciation of the origins and consequences of genetic variability. About one-third of the lectures are presented on cases illustrative of basic genetic problems.

Those students who have had formal training in genetic principles prior to entry have the option of presenting a paper instead of taking the regular examinations. However, they are encouraged to attend the clinical lectures, which will present material new to them.

Elective Courses

*BCH-251(B). *Biochemistry of Development*. Current concepts on control mechanisms in embryonic development and differentiation discussed at the cellular, biochemical, and molecular level. 2 units. given on alternate years. (Also listed as *MIC-251.) Weight: 2 per 18 weeks. Terms 1 and 2: Sept.-Jan. *McCarty, Joklik, Turkington, and Harris*

*BCH-303(B). *Macromolecules*. The structure of biological macromolecules and their relations to biological functions. The emphasis is on proteins and enzymes. Weight: 2 per 9 weeks. Terms 1 and 2: Sept.-Jan. *Tanford and Hill*

*BCH-307(B). *Enzyme Mechanisms*. A review of techniques for the purification of enzymes, thermodynamic aspects of enzyme catalysis, parameters of the activation process, and overall reactions are considered. Model reactions are used to gain insight into the mechanisms of enzymic reactions. The number and affinities of binding sites, and the identification of the residues involved in the activation of enzymes will also be considered. 2 units. Weight: 1½ per 9 weeks. Terms 1 and 2: Sept.-Jan. *Fridovich and Rajagopalan*

*BCH-308(B). *Metabolism*. A lecture and conference course on the chemical transformations of biological compounds, emphasizing the control of metabolic pathways. Weight: 1½ per 9 weeks. Terms 3 and 4: Jan.-May. *Kamin and Staff*

*BCH-310(B). *Nucleic Acids and Macromolecular Synthesis*. Physical properties of nucleic acids in terms of covalent structure, helix, base pairing, helix-coil transitions, as well as properties that influence fractionation by techniques of column-fractionation, velocity and equilibrium centrifugation, and so forth are considered in relation to biological function. Protein-nucleic acid interactions, as well as damage, repair, and mechanisms of synthesis will be reviewed. Mechanisms of RNA transcription and enzymatic alterations of preformed macromolecular structures will be illustrated by recent examples. Protein synthesis and polypeptide bond formation is considered in terms of initiation, decoding, translocation,

ribosomes, termination, and release. Weight: 1½ per 9 weeks. Terms 3 and 4: Jan.-May. *McCarty and Guild*

BCH-312(B). *Clinical Chemistry Laboratory*. Medical students may participate in the program of Clinical Chemistry Laboratory. Students must receive the permission of the instructor. Weight: 4 per 9 weeks. Terms 1, 2, 3, and 4: Sept.-Nov., Nov.-Jan., Jan.-March, April-May. *Habig*

*BCH-316(B). *Molecular Genetics*. An advanced course on genetic mechanisms and their relationship to nucleic acids. (Listed also as Genetics 316.) Weight: 1½ per 9 weeks. Terms 3 and 4: Jan.-May. *Guild and Staff*

*BCH-347(B). *Special Topics*. Current topics in biological oxidations. A lecture, conference, and seminar course which deals with the mechanisms of electron transport and energy conservation in a variety of oxidative enzymes. These mechanisms will be examined both in purified enzymes and in organized systems such as the mitochondrion, the endoplasmic reticulum, and the chloroplast. Weight: 1 per 9 weeks. Terms 1 and 2: Sept.-Jan. *Kamin, Fridovich, Rajagopalan, and Lynn*

*BCH-348(B). *Special Topics*. Current topics in immunochemistry. The structure, function, and specificity of antibodies. Immunogenicity and tolerance with special emphasis on current theories of the diversity and synthesis of antibody molecules. (Listed also as Microbiology 348.) Weight: 1 per 9 weeks. Terms 3 and 4: Jan.-May. *Sage and Day*

*BCH-351(B). *Genetics Seminar*. Required of all students specializing in genetics. Weight: ½ per 9 weeks. Terms 1 and 2: Sept.-Jan. *Gross and Staff*

*BCH-352(B). *Genetics Seminar*. Required of all students specializing in genetics. Weight: ½ per 9 weeks. Terms 3 and 4: Jan.-May. *Gross and Staff*

*BCH-354(B). *Biochemistry of Disease*. This course is designed for third and fourth year medical students who wish to gain further insight into the biochemical basis of certain diseases. Particular attention will be given to those diseases which can best be defined in molecular terms including the hemoglobinopathies, thalassemia, diseases involving the immunoglobulins, blood clotting, diabetes, jaundice, and certain special diseases involving the complex lipids, connective tissue, and muscle. Weight: 1 per 9 weeks. Terms 3 and 4: Jan.-May. *Hill, Lynn, Kredich, Kelly, Kaufman, and McCarty*

BCH-355(B). *Research in Genetics*. In a limited number of cases, a student will be permitted to participate in the research program of a faculty member. Acceptance is by individual arrangement with the proposed faculty preceptor. Weight: 1-8 per 9 weeks. Terms 1 and 2: Sept.-Jan.

BCH-356(B). *Research in Genetics*. In a limited number of cases, a

student will be permitted to participate in the research program of a faculty member. Acceptance is by individual arrangement with the proposed faculty preceptor. Weight: 1-8 per 9 weeks. Terms 3 and 4 or summer: Jan.-May, June-Aug.

BCH-357(B). *Research in Biochemistry*. In a limited number of cases, a student will be permitted to participate in the research program of a faculty member. Acceptance is by individual arrangement with the proposed faculty preceptor. Weight: 1-8 per 9 weeks. Terms 1 and 2: Sept.-Jan.

BCH-358(B). *Research in Biochemistry*. In a limited number of cases, a student will be permitted to participate in the research program of a faculty member. Acceptance is by individual arrangement with the proposed faculty preceptor. Weight: 1-8 per 9 weeks. Terms 3 and 4 or summer: Jan.-May, June-Aug.

*MIC-371(B). *Animal Cell Biology*. An introduction to morphology, fractionation, characterization, and synthesis of cellular organelles (Chromosomes, membranes, ribosomes, nucleoli, lysosomes, etc.). The use of tissue culture systems for studying cellular functions, synthesis of nucleohistones, the mitotic cycle, etc. (Also listed as BCH-371). Weight: 1 per 9 weeks. Terms 1 and 2: Sept.-Jan. *Joklik, McCarty, and Staff*

*MIC-384(B). *Virology*. The structure and replication of viruses with emphasis on the molecular and functional aspects. The first part deals with bacteriophages, the second with mammalian and avian viruses. Weight: 1 per 9 weeks. Terms 3 and 4: Jan.-May. *Joklik, Luftig, Smith, and Zweerink*

*PHS-395(B). *Biochemical Pharmacology I*. The courses will emphasize mechanism of action of drugs in the areas of (1) metabolism and toxicology; (2) antibiotics; (3) steroids; (4) antimetabolites and oncolytic agents; (5) embryology and development; (6) hematopoietic system and porphyrins; (7) lipids and carbohydrates; (8) membrane structure and function; (9) ground substance (mesenchyme). Three of the above topics will be covered in the course each year. The lectures will correlate the material in terms of clinical significance. Weight: 1 per 9 weeks. Terms 1 and 2: Sept.-Jan. *Bressler, Brendel, Lack, Palmer, Posner, Elford, Kirschner, and Kamin*

Cardiovascular-Respiratory Sciences Study Program

The Cardiovascular-Respiratory Sciences Program (CVS-201B) is designed to offer third year students integrated instruction for one academic year in the basic sciences which relate to the cardiovascular and respiratory systems. The program is interdepartmental in nature and will

constitute a full credit load for those students who participate. It is comprised of three parts that run concurrently.

1. *Individual Tutorial.* The student will identify with a senior member of the Medical School faculty who is participating in the program. The major part of the educational program for the student will be in the form of individual tutorials with this member of the staff. This tutorial may be full-time independent research or an intensive study experience for the student. The student and his tutor will develop a plan and will review it with the directors of the program.

2. *Group Seminar.* A seminar series will be developed, the purpose of which is to read and discuss selected papers and discuss problems of instrumentation and topics which are considered complementary to the required lecture course. Students will be active participants in the seminar, and through this mechanism it is hoped to integrate knowledge of cellular physiology into an understanding of organ system function and control. Other seminars may be taken in addition to this.

3. *Lecture Course.* The course in cardiovascular and respiratory physiology and pharmacology offered by the Department of Physiology is required. This course will present selected topics in cardiovascular and respiratory physiology and pharmacology, including electrophysiology, mechanics, structure, developmental physiology, metabolism, energetics, peripheral circulation, diffusion, gas transport, mechanics of respiration, and respiratory responses in hypobaria and hyperbaria. This course will meet twice a week for one hour each session. Other courses may also be taken. The student will be encouraged to complement his tutorial by taking at last one additional third year course, if it is considered appropriate by the tutor and the program director.

The above plan provides a structured and recommended curriculum design. Within this framework multiple pathways are available because of the concentration of effort in the tutorial experience. Tutorials can be arranged within any of the basic science departments or with individuals in clinical departments whose orientation and research are consistent with the goals of the program. Once a tutor is identified, added flexibility is gained by having the option to elect courses in addition to the required course in physiology and pharmacology or to elect seminars in addition to the group seminar. Weight: 9 per 9 weeks. Terms 1, 2, 3, and 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Program Directors: Johnson and Wallace*

Clinical Cancer Training Program

Professor W. Shingleton, *Chairman*; Associate Professors J. Laszlo, G. Wilbanks, J. Cavanaugh, S. Porter, S. Heyden, Johnson

The Clinical Cancer Training Program, supported by a grant-in-aid from the USPHS, is designed to improve clinical cancer training for the medical student and for the postdoctoral trainee.

The basic course (SUR-291C) is an interdepartmental survey of basic and clinical cancer. It is offered as an elective to senior medical students and for postdoctoral fellows in the Training Program. Weight: 2-8. Terms 1 or 3: Sept.-Nov., Jan.-March.

Additional time is spent in those areas in the Medical Center primarily involved with cancer diagnosis and treatment, such as surgical pathology, radiotherapy, medical and pediatric hematology, and inpatient and outpatient tumor services of the Departments of Surgery and Obstetrics and Gynecology. The student or trainee may choose one or several of these areas in which to work, and individual programs can be developed for each participant according to his specific interests.

The Training Program is supplemented by a tumor registry where accurate follow-up records are available to staff and students. The data collected include results of treatment of large numbers of patients as expressed in percentages of those (1) free of recurrence, (2) apparently cured, (3) having a recurrence, or (4) dead of recurrence at varying times after onset of the disease and the institution of therapy.

The faculty for the training program consists of selected members of the Medical School faculty who possess an interest in clinical cancer teaching and who are designated for this type of teaching by their department heads.

Community Health Sciences

Professor E. Estes, Jr., *Chairman*; E. Long, D. Smith (Emeritus), M. Musser, M. Woodbury; Associate Professors M. Bryson, S. Heyden, E. Persons, L. Pondy; Assistant Professors E. Hammond, J. McFarland, M. Mauney, W. O'Fallon, R. Portwood, F. Starmer, H. Thompson; Associates F. Dalton, R. Howard, C. Knight, H. Kotin, D. Lewis, D. Nauman, J. Nowlin, R. Thompson; Research Associate F. Dorsey; Instructor H. Register, Visiting Scholar L. Goldwater

Required Course

The required course in community health sciences (CHS-200) will be given during the second year. Two hour lectures are given by faculty and guests each week. This series serves as an introduction to biostatistics, epidemiology, industrial medicine, community health and family medicine, and transmission and natural history of some diseases.

Elective Courses

CHS-208(B). *Medical Uses of Computers*. The elements of digital computer programming and techniques of data storage and retrieval. Emphasis will be on familiarizing the student with possible uses of digital computers in a variety of medical data handling problems. Weight: 2. Term 2 or 4: Nov.-Jan., April-May. *Thompson*

CHS-215(B). *Biostatistics in the Medical Sciences*. The theory and application of basic statistical concepts as they affect the design and analysis of biomedical research activities. Weight: 2. Term 3 or summer: June-Aug., Jan.-March. *O'Fallon*

CHS-225(B). *Digital Computers and Their Applications in the Health Sciences*. For students desiring an intensive exposure to medical computer applications. This course provides a variety of options in computer medicine. A complete course begins in the summer and goes throughout the school year. It includes Math 151 (Digital Computers), which will be taught in an intensive sequence in the second summer term preceding the rest of the course. A weekly seminar and apprenticeship to a clinician utilizing computers form a central focus for the course. Weight: 4 per term. Term: 1, 2, 3, 4, and summer. *Thompson and Woodbury*

CHS-207(C). *Research in International Health*. A detailed study of a major health problem in the Western hemisphere. Spanish language instruction included through summer school. Visit to a Latin American country for which financial assistance is available. Weight: 1. Terms 1, 2, and 3: Sept.-Nov., Nov.-Jan., Jan.-March. *Long and Staff of U.N.C. School of Public Health*

CHS-210(C). *Student Community Health Program*. Study of community health problems in United States and abroad. First summer: instruction at Duke and U.N.C. School of Public Health; instruction in Spanish. Second summer: field work under supervision in public health in Guatemala. Elective nine-week period in fourth year at mission hospital in Nicaragua. Financial aid available. Weight: 9. Term: June-Aug., summer term. *Long and DeMaria; Faculty of Department of Community Health Sciences, Duke; School of Public Health, U.N.C.; Department of Preventive Medicine, University of San Carlos, Guatemala; Director, Gray Memorial Hospital, Nicaragua*

CHS-217X(C). *Community Health in Georgia*. An experience in applied community health sciences in Georgia. Epidemiology of cardio and cerebrovascular disease. Evans County Study was started in 1960 and is now in its second round. Development of research projects depending on the special interest of the student leading to papers for publication. Room and board and mileage will be paid by the Evans County Health Department. Weight: 9. Term: Summer, June-Aug. *Dr. Heyden and Dr. Hames (General Practitioner, Director of the Evans County Study)*

CHS-219(C). *Tutorial in Clinical Epidemiology*. Selected topics will

be chosen for intensive reading and discussion. Major emphasis is on cardio and cerebrovascular chronic degenerative and major neoplastic diseases, including patient demonstrations on the ward. Weight: 2. Terms 3 or 4: Jan.-March, March-May. *Heyden*

CHS-221(C). *Computers in Patient Monitoring and Clinical Research*. For students who have already learned the fundamentals of digital computing, an advanced tutorial concerning the use of large computers in the handling of analog and categorical clinical data originating from patients. Each student will be encouraged to pursue an independent research project. Weight: 2-4. Every term. *Thompson and Starmer*

CHS-223(C). *Edgemont Clinic*. A volunteer-manned clinic, organized and operating in a low income neighborhood in East Durham. Clinic is organized by the neighborhood council, with the assistance of medical, nursing, and other health profession students. Supervised by faculty volunteers. Weight: 1. Every term. *Goldwater*

SUR-291(C). *Cancer: CHS, MED, MIC, OBG, PED, PTH, RAD, and SUR aspects*. Taught by an interdepartmental faculty, course consists of seminars in clinical and related basic aspects of oncology (6 hour week); case presentation conferences (2 hour week); and ward and clinic experiences in diagnosis and treatment (remaining time). The student elects one clinical department for the ward and clinic experiences. Weight: 2-8. Terms 1 and 3: Sept.-Nov., Jan.-March. *Shingleton, Cavanaugh, Heyden, Johnston, Joklik, Laszlo, and Porter*

Endocrinology

Associate Professor H. Lebovitz, *Director*; Associate Professor H. McPherson, *Director, Endocrine Clinic*, Professor R. Bressler; Assistant Professors R. E. Fellows, R. Gibbs, R. Turkington, C. Hammond; Associates J. Feldman, S. Fortney, T. Huff
Fellows J. Males, G. Cunningham, H. Delcher, J. Gordon, K. Quickel, A. Boyd

The Division of Endocrinology was organized by Dr. E. C. Hamblen in 1936 as a division of the Department of Obstetrics and Gynecology. In 1955 it was reorganized as an integrated service with a staff drawn from several clinical and preclinical departments. Its objective is to give comprehensive training in basic and clinical endocrinology and metabolism, particularly at the postgraduate level. Although individual senior staff members have their own special clinical and research programs, the division is organized so that clinics, conferences, ward rounds, and seminars are participated in as joint ventures by the entire staff. The endocrine laboratory and its services are available to all members of the staff equally. Resident physicians from medicine, obstetrics and gynecology

cology, and pediatrics rotate through the endocrine division. At any one time there are usually four residents assigned to the division. Clinical and research fellows and trainees are assigned to individual senior staff members, depending on their major interest, but all participate essentially equally in the clinics, teaching rounds, and conferences.

The general Endocrine Clinic meets four mornings and the Metabolism-Diabetes Clinic one morning each week. The Pediatric Endocrine Clinic meets one afternoon a week. All fellows have the opportunity to attend these clinics and in addition the clinical fellows assist in the care of the private patients with endocrine and metabolic disturbances including diabetes. Twice a month the Endocrine Clinic meets jointly with the neurosurgical tumor follow-up clinic to review patients with pituitary tumors and related brain lesions. Ward rounds on inpatients are held from 4 to 5 p.m., Monday and Friday and at 9 a.m. on Wednesday each week. An endocrine conference is conducted weekly. In addition, each of the supporting services (medicine, obstetrics and gynecology, and pediatrics) has special conferences, lectures, and seminars of endocrine interest which are available to the staff.

Endocrinology Study Program

The Endocrinology Study Program (EDR-201B) is an interdepartmental program offering an opportunity for intensive study in endocrinology, neuroendocrinology, reproduction, and endocrine metabolism in Year 3. The program emphasizes guided independent study and the development of a tutorial relationship with a member of the program faculty.

The program curriculum, which provides full credit for Year 3, consists of the following components:

1. *The Endocrinology Study Seminar.* This meets twice a week and will focus on particular topics in endocrinology, reproduction, and metabolism in order to develop current concepts through critical evaluation of the literature.

2. *The Individual Tutorial.* The tutorial is arranged by consent with a program faculty member will involve laboratory and/or library research in one aspect of endocrinology, reproduction, or metabolism.

3. *A Lecture Course.* Courses numbered PHS-402(B) and PHS-403(B), Endocrinology and Reproduction, will be taken by all students in the program. In addition, other courses, selected either from a list of suggested program electives or from any of the electives approved for basic science credit in the third year, may be taken up to two credits per term. Arrangements will be made for all interested students to meet with program faculty members to explore possible tutorial arrangements

before they enter the program. Weight: 9 per 9 weeks. Terms 1, 2, 3, and 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Fellows and Staff*

Medicine

Professors J. B. Wyngaarden, *Chairman*, R. Bressler, J. L. Callaway, E. H. Estes, J. C. Greenfield, J. P. Hendrix, A. Heyman, W. Kempner, G. P. Kerby, J. Laszlo, W. S. Lynn, H. D. McIntosh, E. E. Menefee, M. J. Musser, W. M. Nicholson, E. S. Orgain, E. L. Persons, J. B. Pfeiffer, R. R. Robinson, J. M. Ruffin, R. W. Rundles, H. A. Saltzman, S. M. Sessoms, H. O. Sieker, E. A. Stead, M. P. Tyor; Associate Professors S. H. Appel, J. P. Boineau, I. A. Brody, C. E. Buckley, T. R. Cate, J. R. Clapp, W. L. Floyd, J. C. Gunnells, K. H. Kilburn, M. Kinsbourne, J. A. Kylstra, H. E. Lebovitz, H. T. McPherson, J. J. Morris, S. Osterhout, T. Peele, E. Peschel, J. Ramirez-R., W. F. Rosse, H. R. Silberman, H. K. Thompson, J. P. Tindall, A. G. Wallace, R. E. Whalen; Assistant Professors V. S. Behar, A. R. Dowell, H. L. Elford, A. V. Escueta, R. Fellows, C. J. Gerber, R. H. Gibbs, R. J. Gorten, J. F. Griffith, W. N. Kelley, Y. Kong, N. M. Kredich, W. B. Kremer, L. S. Lessin, M. E. McLeod, H. Nagaya, R. H. Peter, R. M. Portwood, S. M. Schanberg, C. F. Starmer, C. C. Tisher, A. Tourian, R. W. Turkington, J. J. West, D. L. Young; Associates D. L. Brewer, M. Dick, J. M. Feldman, S. R. Fortney, J. T. Garbutt, J. Hijmans, A. T. Huang, T. A. Huff, W. J. Klein, J. A. McFarland, P. A. McKee, S. M. McMahon, D. S. Miller, F. A. Neelon, B. C. Newborg, S. H. Quarfordt, B. W. Ramo, J. E. Roberts, J. Ruskin, J. E. Rygorsky, A. Walston, H. J. Zeft

Professor of Experimental Medicine: G. H. Hitchings, R. A. Maxwell, C. A. Nichol; *Associate Professor of Experimental Medicine*: G. B. Elion

Clinical Assistant Professors: A. D. Cooper, W. C. Styron

Clinical Associates: S. W. Barefoot, W. Batten, J. R. Bumgarner, G. W. Crane, C. L. Curry, W. Fitzgerald, P. Gebel, H. E. Grode, T. T. Jones, C. Johnson, G. E. Koury, T. D. Long, E. Lupton, J. A. Lusk, D. E. Miller, J. A. More, H. T. Perkins, J. G. Robbins, W. V. Singletary, A. D. Smith, D. Welton

Clinical Instructors: J. D. Hamilton, J. A. Merchant

Instructors: M. H. Allen, C. F. Aquadro, T. D. Beardmore, W. H. Bell, W. T. Bennett, A. E. Boyd, III, J. G. Burch, L. J. Burger, T. J. Burke, W. H. Carter, H. C. Carton, H. J. Cohen, R. E. Cohen, R. A. Cordon, R. Cotrufo, G. R. Cunningham, S. B. Curry, R. M. Davidson, H. K. Delcher, S. Y. Eguro, I. D. Fox, R. D. Gentzler, II, S. R. Giamber, J. P. Gockerman, J. H. Gordon, J. F. Hallal, G. M. Halprin, K. C. Hanson, T. R. Harris, A. Itoh, H. B. Kelso, M. E. Kendall, T. J. Kenney, A. B.

Latty, G. L. Logue, S. Lunzer, J. L. Males, F. F. Martin, K. M. Matchett, R. L. McGowan, W. S. Myers, K. Nakajima, G. A. Nottebohm, G. Ohl, K. E. Quickel, D. C. Rausch, M. G. Robinson, R. S. Rogers, III, R. A. Rosati, M. P. Rozear, A. J. Rufty, J. E. Rygorsky, W. H. Saunders, W. H. Schoenfish, N. R. Schram, P. D. Springberg, S. J. Victor, J. R. Vilseck, G. S. Wagner, M. B. Waxman, N. K. Weng, R. J. Williams, K. E. Wright

Chief Residents F. A. Neelon, D. L. Brewer, R. W. Markham, L. J. Burger
Assistant Residents H. V. Austin, R. P. Benjamin, A. S. Brenner, A. G. Bartel, W. L. Coker, Jr., B. W. Dixon, R. H. Dixon, R. J. Emslie, M. S. Fedotin, J. J. Gallagher, D. B. Gilbert, R. F. Gordon, D. P. Henry, O. J. Ignacio, H. E. Kann, H. B. Kelso, S. E. Kohler, J. D. Laymon, G. M. Levine, W. S. Logan, D. F. Mandetta, R. W. Markham, S. Masters, R. G. Matthews, H. B. Mundy, T. E. Nash, D. F. Newton, J. G. Nuckolls, E. M. Overfield, M. D. Parker, T. N. Reisman, J. R. Rice, N. M. Richards, C. P. Riley, S. G. Romeo, M. Rotman, C. J. Rubenstein, W. H. Spencer, T. L. Standlee, E. W. Stevens, Jr., D. M. Treiman, J. W. Turner, L. C. Werneck

Interns R. W. Alexander, W. J. Arnold, G. S. Berger, J. A. Boylston, J. M. Cooper, D. P. Cruikshank, R. H. Dixon, J. Dranov, M. S. Entmacher, T. W. Fauntleroy, D. J. Filip, C. S. Foster, C. C. Fulkerson, R. D. Gentzler, H. R. Giles, H. L. Greene, C. W. Hartman, J. M. Herron, W. R. Kenny, R. A. Knazek, J. E. Krook, L. G. Lefer, W. H. Marshall, S. J. Masters, W. W. O'Neill, M. A. Passero, D. W. Rowe, M. A. Savin, G. A. Shapiro, J. S. Skyler, S. F. Stein, W. Stopford, A. S. Tornay, J. R. Ujda, H. J. Williams, R. J. Williams, R. M. York

Required Course

The Department of Medicine traditionally has the responsibility of preparing the student for a lifetime of learning as he gives care to patients who ask him for help. The first step is to begin to think and act like a doctor. A course in the first year—Introduction to Clinical Medicine (MED-201)—prepares the student to take an active role in patient care.

The student assigned to medicine (MED-205) in the second year or electing medicine in the fourth year acts in the role of a physician. His desire to give good care is the motive which drives him to excellence. He learns to identify properly the problems of the patient. Having identified the problems, he marshals the information he can bring to bear on them by his past training; he recognizes the gaps in his knowledge as he attempts to focus the information learned from the basic sciences onto the specific clinical problem. Using the patient as his means of integration, he continues his reading in anatomy, physiology, microbiology, pharmacology, and biochemistry. He reads widely in medical texts. In this clinical setting, he discusses the problem with his fellow students,

interns, residents, and senior staff; he gains familiarity with ideas and concepts by actively manipulating them.

The student crystallizes his idea of the best diagnostic and therapeutic approach to his particular patient. He identifies the reasons for each of these decisions. He has real curiosity to see if his evaluation of the situation is correct or in error.

Under guidance from his fellow students, from house staff, and from faculty of all ranks, he slowly appreciates the difficulties of learning a system of medicine in which disease manifestations and host responses are highly variable. He learns that the "textbook picture" is a composite seldom seen. Part of a doctor's learning is only experimental. He knows from living with his patients that certain things are possible, but he may not know the underlying sequence of events. In other instances, his learning is more precise because he understands the mechanism of the disease and can control some of the important variables. He must learn both the liabilities and virtues of attempting to use logic in clinical practice.

The goal of the Department of Medicine is for the student to have as many learning experiences as possible in which he plays an active role. We hope that he will enjoy these learning experiences so much that he will continue them as long as he sees patients. We are not interested in covering the entire field of medicine. The student will engage in extensive postdoctoral clinical or research training. We want him to acquire the scientific knowledge, clinical skills, and learning habits that will enable him to identify and solve new problems as he encounters them. We are not concerned that a new area of knowledge is being explored without our guidance.

In caring for our patients with ill-defined genetic and acquired differences and with many variables of unknown strength at play, many erroneous conclusions are drawn. The student has to learn to examine statements, both oral and written, with care, and to ask of all authorities the source of data which underlie their conclusions. One way for the student to learn the difficulties in drawing accurate conclusions about biological systems is to give him the opportunity to establish some fact on the basis of his own research. This is a very effective method of teaching. The intellectual discipline involved better prepares the future clinician for the role of a lifetime learner. The experience also enables the academically oriented student to assess his own potentialities for an investigative career.

MED-201. *Introduction to Clinical Medicine.* This course is designed to introduce the student to the methods involved in obtaining information about patients and their problems by means of accurate and complete taking of history and performance of physical examination and laboratory examination. Early in the course, the student is taught the methodology of the patient interview, the essentials of the examination of

various organ systems, and the techniques and meaning of the hematological and other laboratory examinations by means of introductory lectures and experience with patients on the ward and in the laboratory. Information obtained in the other first year courses is correlated with clinical manifestations of health and disease. In the latter part of the course, the abnormalities found in the physical examination of certain organ systems are correlated with the abnormalities of laboratory values found in such patients. Patient conferences are used to demonstrate the value of bringing to bear all the means of obtaining data about the patient in solving his problems. The student is expected to learn to do this in patients with whom he has contact during the ward sessions.

MED-205. Medicine. The second year course in medicine is aimed at providing the student with the basic tools used in the practice of medicine. This is the time when he should consolidate the material learned during the first year and apply it to the study of his own patients. During a brief seven week course it is not possible to cover systematically the entire body of knowledge of internal medicine; instead, the student is provided a series of representative learning experiences based on the case study method. Our goals are to teach a method of approach to the patient, and to provide a firm foundation for the solution of new medical problems as they are encountered in the months and years ahead. Specific expectations of the sophomore student are listed below.

1. The student is expected to obtain and carefully record meaningful histories and physical examinations from two or three patients each week. On the night of admission the student will review and compare his findings with the responsible intern or resident; points of difference should be settled where possible by return of the two persons to the bedside. The following day the student will present his data to the attending physician. The presentation should be well organized (with the help of the resident), and the present illness should include a carefully reasoned documentation of the events which led to the patient's hospitalization, given in chronological order. It should contain pertinent facts leading to the most likely diagnosis and also the pertinent negative facts which weigh against a possible alternative diagnosis.

2. A student is expected to examine his patients repeatedly and reflect on the diagnostic and therapeutic management. It is his responsibility to understand the objectives and to know the results and the interpretation of all diagnostic tests applied to his patients. He will actually perform as many of the necessary tests as possible. He will record his thinking in frequent progress notes.

3. The student is expected to read widely on topics related to his patients with particular emphasis upon applying basic science knowledge to the understanding of disease mechanisms. He should begin with the descriptions in standard textbooks of medicine which serve as a useful introduction to the subject. Special aspects of the patient's prob-

lem should be pursued in basic science or other textbooks, in monographs, or in relevant journal articles.

4. The student is expected to know in depth those diseases present in his own patients, including differential diagnostic features which distinguish those conditions from related diseases. At this stage of training he is not expected to have equivalent depth of knowledge of diseases that he has not encountered, but he is responsible for knowing the major points about patients presented on rounds or at the various noon conferences. Principles of therapy should be understood; details of drug regimens are better left for subsequent experiences. The student is encouraged to participate actively in all teaching exercises on the ward, whether or not his own patients are being discussed.

Elective Courses

MED-202(C). *Introduction to Clinical Neurology*. Overall view of clinical neurology for non-specialist. Emphasis on clinical techniques in neurologic examination, approach to neurologic diagnosis and anatomic, pathologic and physiologic basis for localization of neurologic lesions. EEG and neuro-roentgenogram interpretation. Common neurologic disturbances at bedside conferences. Weight: 2. Every term. *Appel, Heyman, and Neurology Staff*

MED-204(C). *Correlative Neurosciences*. A view of clinical neurology with emphasis on relation to basic neurosciences. Course especially for students planning careers in psychiatry, neurosurgery, internal medicine, pediatrics, orthopaedics or neurology. Opportunities for examination of patients with neurologic diseases, discussion seminars, and a guided program of reading. Weight: 4. Every term. *Brody and Neurology Staff*

MED-206(C). *Clinical Clerkship in Neurology*. A clerkship in clinical neurology emphasizing diagnosis and therapy of neurologic diseases. The students will participate in inpatient and outpatient workups, teaching conferences, and diagnostic studies. Weight: 8. Every term. *Appel and Neurology Staff*

MED-207(C). *Advanced General Medicine*. The student is assigned to inpatient or outpatient medical services, or to the emergency ward, and is responsible for patients assigned to him. He will learn about disease and its management through the staff and consultants directly concerned with the patients. Weight: 8. Every term. *Wyngaarden and Staff*

MED-208(C). *Cognitive Neurology*. The syndromes arising from focal cerebral damage studied at bedside and by experimental psychological methods. Emphasis on detailed analysis of disturbed cerebral function (aphasia, agnosia, etc.) Comparable methods used to study children with reading and writing difficulties. Instruction will be given in experimental psychological techniques. Students assigned to ongoing research

projects. Weight: 4-8. Terms 1 and 3: Sept.-Nov., Jan.-March. *Kinsbourne*

MED-209(C). *Allergy and Respiratory Diseases*. Course provides both introduction and in-depth training in the clinical and laboratory aspects of allergic and respiratory illnesses. Patients are assigned to the student from both the in and outpatient services. Seminars and conferences are held throughout the week for instruction in allergy, clinical immunology, basic immunology, pulmonary function evaluation and pulmonary physiology. Weight: 8. Every term. *Buckley, Cate, Kilburn, Kystra, McMahon, Menefee, Nagaya, Pratt, Ramirez-R., Saltzman, and Sieker*

MED-212(C). *Neuromuscular Diseases*. Particularly for students planning careers in orthopaedics, neurology, or other specialties involving pathophysiologic mechanisms of neuromuscular diseases. Clinical presentation of selected cases of muscular dystrophy, myopathy, peripheral neuropathy. Seminars relating the neuromuscular disorders to recent information on the chemistry and ultrastructure of the neuromuscular system. A view of the principles and practice of electromyography. Weight: 1. Term 2: Nov.-Jan. *Brody and West*

MED-214(C). *Vascular Diseases of the Nervous System*. Comprehensive approach to neurologic, surgical, and roentgenographic aspects of vascular disease. Consideration given to etiology, prevention, diagnosis, and therapy. Students will evaluate patients with various cerebrovascular syndromes; participate in diagnostic studies; and assist in aspects of care, from acute care of patients with recent stroke to design of and administration of rehabilitation program. Emphasis on bedside patient care, techniques of diagnosis, and recent research developments. Weight: 2. Terms 1, 3, and 4: Sept.-Nov., Jan.-March, March-May. *Heyman, Gerber, and Neurology Staff*

MED-215(C). *Clinical Dermatology*. Students will be assigned to public and private outpatient clinics and will be assigned public and private patients in the hospital in an effort to understand the pathologic physiology of dermatologic disorders and thus management and treatment. Special arrangements needed for 4 or 5 credits. Weight: 2, 4-5, 8. Every term. *Callaway and Tindall*

MED-217(C). *Gastroenterology*. The role of the gastrointestinal tract and liver in health and disease is emphasized through use of liver and small bowel biopsy with morphological, biochemical, and physiological studies in the daily diagnosis and care of patients hospitalized on the gastroenterology inpatient service and general wards. Weight: 8. Every term. *Tyor, Garbutt, Hijmans, McLeod, Quarfordt, Ruffin, and Young*

MED-221(C). *Metabolism and Endocrinology*. A general course in the clinical and laboratory diagnosis of metabolic and endocrinologic disorders. The student participates in the work up and management of both

inpatient and outpatient problems. Weight: 8. Every term. *Lebovitz, McPherson, Nicholson, Bressler, Gibbs, and Turkington*

MED-227(C). *Rheumatic Diseases*. The student acquires experience in depth in the recognition and care of patients with generalized connective tissue diseases. He works up and follows patients on wards and in clinic. Daily rounds with the staff extend his experience. He learns specialized laboratory and clinical techniques. Full time nine weeks recommended. May be taken for 4 units credit; student spends full time on unit for 4½ weeks; 4½ weeks on another course by agreement with that instructor. Weight: 4 or 8. Every term. *Kerby, Persons, Roberts, Wyngaarden, and Kelley*

MED-229(C). *Nephrology*. Fundamental and clinical aspects of nephrology, renal physiology, hypertension, renin-angiotensin metabolism, and disorders of salt and water metabolism. Full clinical participation on inpatient and outpatient services and the dialysis-transplantation service is offered. Attendance at several scheduled rounds, conferences, and seminars is required. Weight: 8. Every term. *Robinson, Andreoli, Clapp, Gunnells, Klein, Peschel, and Tisher*

MED-231(C). *Clinical Hematology and Oncology*. Unique opportunity to participate actively in care and study of patients with wide variety of hematologic diseases—anemias, bleeding disorders, leukemias, lymphomas, secondary gout, etc. Systematic, quantitative clinical evaluation, and basic techniques of blood and marrow examination, serum and urine protein studies. Weight: 8. Every term. *Rundles, Silberman, Laszlo, and Rosse*

MED-232(C). *Clinical Oncology*. Instruction in techniques of laboratory and clinical diagnosis and patient care with emphasis on classic hematologic problems and treatable neoplasms. Weight: 6. Every term. *Rundles, Silberman, Laszlo, and Rosse*

MED-234(C). *Metabolic-Genetic Disease Seminar*. This course will explore in detail clinical, metabolic, and genetic information on inborn errors of metabolism. It will include patient presentations, staff lectures, student seminars, textbook, and literature reading. The group will be small enough to permit maximal personal interaction. Weight: 3. Term 3: Jan.-March. *Wyngaarden, Sidbury, Appel, Kelley, Kredich, Lessin, and Staff*

MED-236(C). *Research Topics in Endocrinology and Metabolism*. Research training and experience in the field of endocrinology and metabolism. This is arranged individually between the student and a specific member of the endocrine staff. Weight: 8. Every term. *Lebovitz, Bressler, Gibbs, Turkington, and Staff*

MED-237(C). *Metabolic Response to Disease*. This seminar series deals with the integrative aspects of the endocrine-metabolic response to disease states. Representative topics include the events involved in adaption to feeding, fasting, injury, surgery, infection, and certain medical disorders

(i.e., diabetes, hypoglycemia, etc). Weight: 1. Term 4: March-May. *Lebovitz, Bressler, McPherson, Gibbs, Turkington, and Staff*

MED-240(C). *Cardiovascular Research*. Opportunities for a nine-week research experience can be arranged with many of the members of the Cardiology Division. This program is flexible and the availability in a given area will vary from quarter to quarter. Details of the program may be discussed with Dr. McIntosh and then with the specific staff member. Weight: 4-8. Every term. *McIntosh, Morris, Wallace, Greenfield, Bressler, Thompson, Kong, Peter, Chen, Ruskin, Zeft, Behar, and McKee*

MED-242(C). *Clinical Cardiology (Duke Hospital)*. (See Med-244.) Broad experience in cardiovascular disease provided by participation in patient care as "consultant" and procedures such as cardiac catheterization, phonocardiography exercise studies, and cardioversions, and daily reading of electrocardiograms. Part of program may include functioning as student intern on Cardiology Ward or CCU for four and one-half weeks. In this capacity student has primary responsibility for the management of the patient. Weight: 8. Every term. *McIntosh, Orgain, Floyd, Whalen, and Staff*

MED-244(C). *Clinical Cardiology (VA Hospital)*. Fundamentals of electrocardiography, vectorcardiography, and diagnostic techniques in cardiology. Student makes cardiology rounds daily with staff. Three one-hour periods each week with Dr. Estes concentrating on physical diagnosis in cardiac patient. No direct patient responsibility, but students will observe techniques used in diagnosis and management of cardiologic problems, and spend a minimum of two weeks on Coronary Care Unit. Weight: 8. Every term. *Ruskin, Zeft, Estes, Greenfield, and McKee*

MED-246(C). *Clinical Cardiovascular Physiology*. Physiologic measures and anatomic details at cardiac catheterization used to teach principles of physical diagnosis, clinical management and interpretation of pathophysiology in congenital, rheumatic, and coronary artery disease. Patients assigned with responsibilities for initial evaluation, physical examination, thorough and detail laboratory study and interpretation. Weight: 8. Every term. *Morris, Kong, Peter, Behar, Walston, and Chen*

MED-250(C). *Allergy and Clinical Immunology*. Preceptorship in the laboratory evaluation of patients with immunophysiologic alterations. A review of basic immunology relevant to patient care is reinforced by application to clinical problems available on ambulatory and ward services. An in depth clinical exploration of disease related immunologic problem and understanding of relevant literature is the basis of an assigned term paper. Weight: 8. Every term. *Buckley and Nagaya*

MED-254(C). *Enterohepatic Circulation and Lipoprotein Metabolism*. There will be detailed explorations of biological and related clinical aspects of hepatic and intestinal functions. The course will be structured

chiefly through lectures and relevant patient presentations. Weight: 2. Term 1: Sept.-Nov. *Tyor, Lack, Young, Quarfordt, and McLeod*

MED-256(C). *Ambulatory Patient Care*. The student is assigned to the outpatient department and the emergency room and will see patients assigned to himself and to a colleague house officer. He may design an individualized outpatient/emergency room schedule which will permit him to have a specific balance of acute and chronic illness patients. Weight: 1-8. Every term. *Staff*

PSC-331(C). *Dynamic Approach to Medical Problems Based on Psychoanalytic Theory*. This course will be structured that the tenets and ideas of psychoanalytic psychology will be applied to the ancillary part of the total part of the management of patients on medical and surgical wards (a certain kind of psychosomatic approach). Weight: 2-4. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Bressler*

SUR-223(C). *Medical and Surgical Renal Disease*. Experience is offered in diagnosis and management of surgical diseases of the urinary tract and medical renal diseases with emphasis on clinical patient care. Participation in special urologic clinics and exposure to hemodialysis is offered with emphasis upon renal transplantation, renal failure, renovascular hypertension, and other aspects of medical and surgical disease. Weight: 8. Every term. *Glenn, Robinson, and Respective Staffs*

SUR-291(C). *Cancer: CHS, MED, MIC, OBG, PED, PTH, RAD, and SUR aspects*. Taught by an interdepartmental faculty, course consists of seminars in clinical and related basic aspects of oncology (6 hour week); case presentation conferences (2 hour week); and ward and clinic experiences in diagnosis and treatment (remaining time). The student elects one clinical department for the ward and clinic experiences. Weight: 2-8. Terms 1 and 3: Sept.-Nov., Jan.-March. *Shingleton, Cavanaugh, Heyden, Johnston, Joklik, Laszlo, and Porter*

Medical Research Training Program

Professor W. R. Guild, *Director*; Associate Professors T. McManus, H. Thompson; Assistant Professors H. Harriman, D. Hall, N. Kredich, W. Longley, K. Rajagopalan, L. Siegel, R. Turkington

The Medical Research Training Program (MRT-399B) is an elective available to qualified students in September of their third or fourth calendar year of medical school and to members of the resident staff and postdoctoral fellows with the M.D. degree.

The objective is to give the participant a sound basis for further training directed toward a career in investigative medicine and biology, with opportunity to do individual research for an extended period of time under the direction of a faculty member. Up to sixteen applicants are

admitted annually, about half pre and half postdoctoral, on the basis of interviews by a faculty committee who consider past academic performance and evidence of "research bent" and curiosity.

The formal part of the program occupies the academic year from September to June. It consists of three months of intensive laboratory, lecture, and seminar sessions centered around molecular and cellular biology, didactic courses in mathematics and biomathematics which extend through the year, and a series of student seminars on current research literature during the period January to May. In December each participant selects a research mentor and, with his guidance, works on a problem for seven to fourteen months. In May he presents a seminar on his research accomplishments to that time.

Special lectures and seminars are given by guests from other institutions and by members of the University. The entire program is housed in a special wing of the W. B. Bell Medical Research Building and is directed by members of the faculty who devote a major part of their effort to this program.

The minimum participation in this program is for the period September to June, of which at least two quarters must be non-credit time, for which a stipend will be paid. The student is urged to plan on a longer period, however, as follows: by taking clinical work in the first and second summers and research in the third, he may put together a block of fourteen to seventeen calendar months (September to the following November or January), devoted to basic science and still graduate on time with the normal 50-50 mixture of clinical and basic credits in the elective years of the new curriculum.

To achieve this, credit will be given for continued research time following completion of the formal program in June, with evidence of satisfactory performance to be certified by the student's faculty research director. In the fall of the fourth academic year, the participant may continue research, take courses, or combine the two, as seems best at that time.

Students who already know they wish to go on to a Ph.D. degree are advised to use the time for intensive basic coursework, rather than to take this program. For those who find they wish to do so after some research experience, however, the Graduate School of Duke University will accept the time in this program as part of the residence requirement for a Ph.D. In addition, the student must satisfy course and examination requirements specified by the department of his choice, as well as the language and dissertation requirements of the Graduate School.

Those interested in this program are encouraged to discuss it with the Director early in their career, in order to plan how best to use their summers. It is desirable to obtain the maximum summer credits before September of the third year. Weight: 9. Terms 1, 2, 3, 4, and summer: Sept.-June, June-Aug. research. *Guild, Director; Staff*

Medical Speech Pathology Training Program

The residency program in medical speech pathology is under the direction of Dr. Raymond Massengill, Jr. and is designed to help meet the need for speech pathologists trained to work in medical centers. Candidates are accepted after completing basic academic training in speech pathology from approved institutions. The trainee is designated as a Speech Pathology Fellow. Two trainees are accepted each year, one in September and the other in January. The period of training can be one or two years in length and can be utilized by the trainee to collect basic research data for the thesis or dissertation. The trainee will have graded responsibilities in the Speech Pathology Clinic. This clinic has patients referred for speech and language evaluations following neurosurgery, oral surgery, and plastic and reconstructive surgery. Speech patients other than those who have had surgery are also seen in this clinic such as stutterers, articulation, delayed language development, and patients with speech disorders related to dental anomalies. The trainees may also participate in the Cleft Palate Clinic, the research projects conducted in the Speech Pathology Laboratory and the Summer Speech Residential Program which is held on Duke University campus. The trainee may also participate in the research programs being conducted with participants from plastic and reconstructive surgery, orthodontics, oral surgery, radiology, neurology, neurosurgery, pediatrics, physical therapy, and other allied fields. Through assignments in the above listed areas the trainees can gain additional clinical experience. The trainees spend time with Dr. Kenneth Pickrell, Chief of Plastic Surgery, observing different surgical techniques and with Dr. Galen Quinn, Professor of Orthodontics, observing the construction and fitting of oral appliances designed to help alleviate speech problems. The trainees are supervised very closely by the senior staff and the director of the training program. Fellowships are available through Medical Speech Pathology.

Microbiology and Immunology

Professor W. K. Joklik, *Chairman*; Professors D. Amos, J. Beard, N. Conant, E. Day, J. Larsh, H. Willett; Visiting Professor M. Schlesinger; Associate Professors W. Boyle, R. Burns, R. Metzgar, S. Osterhout, R. Wheat, C. Zmijewski; Assistant Professors R. Blaker, C. Buckley, R. Buckley, R. Luftig, H. Nielsen, S. Oleinick, H. Seigler, J. Southworth, F. Ward

Research Associates K. Anderson, C. Andrus, E. Grothaus, W. Hatfield, A. Hay, G. Hill, Y. Ito, K. Payne, E. Scheer, I. Shif, R. Smith, L. Wilson, M. Whalen, H. Zweerink

Instructors H. Craig, A. Proctor; Fellow B. Hattler

Required Course

The required course in microbiology (MIC 200) is given in the second term of the first year. An intensive study is made of the common bacteria, fungi, and viruses which cause disease in man. The scope of the laboratory course is reasonably wide and acquaints the student with all the methods and procedures employed in bacteriological laboratories. Most of the lecture time is devoted to the immunological and epidemiological aspects of infection. The instruction is designed to give the students a clear concept of: (1) how organisms gain entrance to the body, (2) the type of toxins which they produce, (3) the nature of the immune bodies which are produced by the host, and (4) the methods of preventing the disease by active and passive immunization.

Elective Courses

*MIC-231(B). *Immunology for Medical Students I*. Cellular and humoral responses to foreign (antigenic) substances. The induction of immunity; detection, measurement and nature of antibodies, classes of antigens, allergic and other abnormal reactions. Special topics to be studied will include deficiencies of the immunological system (congenital and acquired); the hypersensitive states (humoral and cellular); and the immunology in relation to disease states illustrated by case presentations and with student seminar participation. Weight: 1½ per 9 weeks. Terms 1 and 2: Sept.-Jan. *Amos, Buckley, and Ross*

*MIC-234(B). *Immunology for Medical Students II*. Continuation of Immunology I. Course will emphasize immunohematology, autoimmune disease, the immunogenetics of tissue and organ transplantation, tumor specific antigens, and immunity to tumors. Weight: 1½ per 9 weeks. Terms 3 and 4: Jan.-May. *Buckley, Amos, and Ross*

*MIC-316(B). *Immunogenetics*. Antigens of tissues and organs, distribution, extraction, and chemistry. Phylogeny of isoantigenic systems of man and animals. Tests for histocompatibility including lymphocyte interactions and reactivity. Change in antigenicity and immune responsiveness in carcinogenesis. Immunologic factors in pregnancy and in homotransplantation of organs. Weight: 1 per 9 weeks. Terms 1 and 2: Sept.-Jan. *Amos and Southworth*

*MIC-325(B). *Medical Mycology*. Intensive study of these fungi which cause disease in man and animals, and will emphasize the diagnosis and treatment of fungus infections as well as give special attention to the epidemiology and public health significance of the fungi. Weight: 4. Term: month of July. *Conant*

MIC-339(B). *Diagnostic Microbiology and Infectious Diseases*. Introduction to the methods for the laboratory diagnosis of infectious

disease and their clinical application. Weight: 8. Terms 1, 2, 3, 4, and summer: Sept.-Nov., Nov.-Jan., Jan.-March, April-May. S. Osterhout

*MIC-371(B). *Animal Cell Biology*. An introduction to morphology, fractionation, characterization, and synthesis of cellular organelles (chromosomes, membranes, ribosomes, nucleoli, lysosomes, etc.). The use of tissue culture systems for studying cellular functions, synthesis of nucleohistones, the mitotic cycle, etc. (Also listed as BCH-371.) Weight: 1 per 9 weeks. Terms 1 and 2: Sept.-Jan. Joklik, McCarty, and Staff

*MIC-381(B). *Bacterial Physiology I*. The structure, composition, growth, and metabolism of bacterial cells with emphasis on the biochemical and regulatory aspects. Weight: 1 per 9 weeks. Terms 1 and 2: Sept.-Jan. Burns, Wheat, and Willett

MIC-382(B). *Bacterial Physiology II*. Continuation of Bacterial Physiology I. Weight: 1 per 9 weeks. Terms 3 and 4: Jan.-May. Burns, Wheat, and Willett

*MIC-384(B). *Virology*. The structure and replication of viruses with emphasis on the molecular and functional aspects. The first part deals with bacteriophages, the second with mammalian and avian viruses. Weight: 1 per 9 weeks. Terms 3 and 4: Jan.-May. Joklik, Luftig, Smith, and Zweerink

*MIC-391(B). *Immunology I*. Structure and function of immunoglobulins. Characteristics of synthetic and natural antigens. Cellular aspects and kinetics of antibody formation. Forms of immunologic responsiveness. Elicitation and control of immune response. Phylogeny and ontogeny of immunity. Specificity and cross-reactivity. Methods of immunologic analysis. Tolerance, enhancement, autoimmunity, and allergy. Weight: 2 per 9 weeks. Terms 1 and 2: Sept.-Oct., Nov.-Jan. Amos, Day, and Metzgar

*MIC-392(B). *Immunology II*. Continuation of Immunology I. Weight: 2 per 9 weeks. Terms 3 and 4: Jan.-March, March-May. Amos, Day, and Metzgar

MIC-399(B). *Preceptorship in Microbiology and Immunology*. An individual reading and/or laboratory course in specialty areas supervised by an individual faculty member. Acceptance, nature of topic, and amount of credit by individual arrangement with proposed faculty member. Weight: 1-8 per 9 weeks. Term: Every term.

MIC-401(B). *Pathophysiology of Infectious Diseases*. Lecture and seminar course concerning mechanisms by which infectious agents cause disease in various organs, and the diagnosis, treatment and prevention of such illnesses. Weight: 3. Term 4: March-June. Katz, R. Buckley, Cate, Lang, S. Osterhout, J. Griffith, and Wilfert

MIC-403(B). *Investigative Problems in Disease Caused by Viruses and Mycoplasmas*. Introduction to techniques for research with viruses and mycoplasmas; clinical experience with infectious diseases related to

the investigative programs. Weight: 8. Terms 1, 2, and 3: Sept.-Nov., Nov.-Jan., Jan.-March. *Cate, Katz, and Lang*

Neurology

Associate Professor S. Appel, *Chief*; Professors A. Heyman, T. Peele, J. Pfeiffer, Jr.; Associate Professors I. Brody, M. Kinsbourne, S. Schanberg; Assistant Professors A. Escueta, C. Gerber, J. Griffith, A. Renuart, A. Tourian, J. West; Fellows H. Carton, R. Cotrufo, S. Lunzer, M. Rozear, N. K. Weng; Chief Resident L. Burger; Assistant Residents J. G. Burch, O. Ignacio, L. Werneck. (*Pediatric Neurology*) Associate Professor M. Kinsbourne; Assistant Professors J. Griffith, A. Renuart

The neurology program is designed to train physicians and scientists who will have an understanding of the concepts and mechanisms of neurobiology and their particular application to the diseases of man.

Obstetrics and Gynecology

Professor R. Parker, *Chairman*; B. Carter, Professor and Chairman Emeritus; Professors W. Cherny, W. Cuyler, C. Peete, W. Thomas; Associate Professors A. Christakos, M. Crenshaw, G. Wilbanks; Associate Clinical Professors E. Easley, R. Pearse; Assistant Professors N. Anderson, C. Hammond, D. Schomberg; Assistant Clinical Professors T. Adkins, W. Graham, K. Podger; Clinical Associates Y. Culton, T. Stokes, R. Williamson, R. Yowell

Research Associates C. P. Jones, L. Kaufmann; *Instructors* B. Baker, C. Parker; *Fellows*: K. Deubler, K. Johnson, L. Wasserman; *Residents* R. Bechtel, L. Borchert, D. Cruikshank, J. Danford, W. Goldston, D. Halbert, T. Henley, D. Jones, C. Peery, E. Sowell, J. Weed, T. Wyatt

Required Courses

The first year student receives instruction in the fundamentals of obstetric and gynecologic history and pelvic examination during their course the Introduction to Clinical Medicine.

The second year student spends seven weeks in General Obstetrics and Gynecology (OBG-202). The student attends lectures, works daily in the general and special outpatient clinics, and is assigned patients on the obstetric and gynecologic wards. Students sharing in patient care and in teaching exercises is required. Tutorials are held daily with the senior faculty encouraging student participation. Lectures, clinical conference,

gynecologic pathology conference, endocrine conference, and correlative seminars are a part of his learning experience and are outlined below.

Elective Courses

OBG-205(C). *Gynecologic Cancer*. A survey of malignancy of the reproductive system. The didactic portion of the course is supplemented by presentations of patients currently in therapy on the wards and in the Gynecologic Cancer Clinic. Weight: 2. Every term. *Wilbanks, Hammond, and Parker*

OBG-207(C). *Pathology: Obstetrical and Gynecological*. Study of normal and pathologic processes in the female in the field of obstetrics and gynecology. Current gross and histologic specimens reviewed along with related material in study collections. Clinical, experimental, and theoretical correlations made when applicable. Weight: 2. Every term. *Wilbanks, Parker, and Gynecology Resident on Surgical Pathology*

OBG-211(C). *Preparation for Practice*. For students preparing for general practice, pediatrics, general surgery, and internal medicine. Inpatient and outpatient duties as an intern in obstetrics and gynecology. Special lectures in obstetric management and office gynecology with emphasis on good practice techniques. Weight: 8. Every term. *Parker and Staff*

OBG-215(C). *The Infertile Couple*. A didactic and clinical study of infertility in the human. Assigned reading of pertinent medical literature both historical and current is correlated with clinical observation in patients. The student is made familiar with testing techniques and the use of required apparatus and instruments, and participates in the treatment of patients. Weight: 1. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Peete and Christakos*

OBG-217(C). *Human Embryology*. Students will study human growth and development in utero. In addition to assigned reading and lectures, pertinent gross and microscopic material shall be studied. Incorporates developmental anatomy, physiology, biochemistry, and, as available, developmental pathology. Weight: 1. Terms 2 and 3: Nov.-March. *Cherny*

OBG-229(C). *Endocrinology Seminar*. Sessions with discussion of interesting clinical problems and related clinical and basic research. Weight: 1. Every term. *Hammond, McPherson, Lebovitz, and Staff*

OBG-231(C). *Clinical Reproductive Endocrinology*. Course for students who desire additional clinical instruction in examination, diagnosis, and treatment of obstetric and gynecologic patients with endocrinopathy. Course consists of examination and treatment of patients in the Endocrinology Outpatient Clinic. Weight: 4. Every term. *Hammond, Staff, and Fellows of Endocrine Division*

OBG-235(C). *Cytogenetics*. In-depth course in human cytogenetics in which basic techniques of studying human chromosomes are applied to

clinical situations. Research in human cytogenetics is also stressed. Weight: 3. Every term. *Christakos*

OBG-241(C). *Family Life Sciences*. A clinical correlative study designed to apply contraceptive techniques, genetic counseling, sex education, and demography in the practice of obstetrics and gynecology. Social implications in these various areas will be included. Weight: 4. Every term. *Christakos*

PED-239(C). *Perinatal Medicine*. A study of factors during pregnancy, labor, delivery, and the first month of life. Emphasis will be placed on teratogenic influences, abnormal conditions of pregnancy as related to the infant, prenatal pathological conditions adversely afflicting the fetus and newborn, and early management of the infant. Current problems in maternal-fetal relationships will be outlined. Weight: 8. Terms 1 or 4: Sept.-Nov., March-May. *Brumley and Crenshaw*

SUR-291(C). *Cancer: CHS, MED, MIC, OBG, PED, PTH, RAD, and SUR aspects*. Taught by an interdepartmental faculty, course consists of seminars in clinical and related basic aspects of oncology (6 hour week); case presentation conferences (2 hour week); and ward and clinic experiences in diagnosis and treatment (remaining time). The student elects one clinical department for the ward and clinic experiences. Weight: 2-8. Terms 1 and 3: Sept.-Nov., Jan.-March. *Shingleton, Cavanaugh, Heyden, Johnston, Joklik, Laszlo, and Porter*

Ophthalmology

Professor J. Wadsworth, *Chairman*; Professor Emeritus B. Anderson, Sr.; Clinical Professor Emeritus F. Stocker; Associate Professor B. Anderson, Jr.; Assistant Professors A. Chandler, Jr., M. Landers, III; Associate J. Seaber; Clinical Associate S. McPherson, Jr.; Research Professor M. Wolbarsht; Research Associate G. Klintworth; Instructor E. Reese; Clinical Instructors R. Dawson, M. Kreshon, L. Turner; Residents N. Young, Jr., D. Dephouse, J. Herring; Assistant Residents D. Thier, J. Carruth, Jr., M. Singleton, C. Wisor, J. Barta, Jr., R. Pietsch

Elective Courses

OPH-201(C). *Investigative Ophthalmology*. The student is assigned a project relating to basic ophthalmologic problems. Technical assistance, sufficient equipment, and laboratory animals are supplied for the completion of the project. The student is expected to attend lectures schedule for the house staff. Weight: 8. Every term. *Anderson and Wolbarsht*

OPH-203(C). *General Ophthalmology*. A clinical preceptorship in which the student will participate and observe in the regular house staff activities, conferences, lectures, patient care, and treatment including

surgery. Emphasis on the use of specialized ophthalmic apparatus is emphasized. Weight: 8. Every term. *Chandler*

OPH-205(C). *Medical Ophthalmology*. The ophthalmic signs and symptoms of systemic disease are presented through patient examination and lectures. Oriented for those students interested primarily in pediatrics, internal medicine, or ophthalmology. Weight: 1. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Chandler and Staff*

OPH-207(C). *Basic Ophthalmic Sciences*. Course designed primarily for those students intending to specialize in ophthalmology and will cover optics, ocular anatomy, physiology, pathology, pharmacology, and numerous ophthalmic disease processes. Many outstanding guest speakers. Weight: 1. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Wadsworth, Staff, and Outside Contributors*

OPH-209(C). *Refraction*. Emphasis on the training of students in basic and advanced knowledge of refraction and the art and science of prescribing glasses for those with normal and subnormal vision is given. Weight: 8. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Chandler*

OPH-211(C). *Neuro-ophthalmology*. Experience is provided in application of ophthalmic diagnostic technique toward the diagnosis of central nervous system and related ocular diseases. Clinical case and research review is included. Special instrument utilization is emphasized. Weight: 1 or 2. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Anderson*

OPH-213(C). *Ophthalmic Pathology*. The student will review all ophthalmic pathology specimens submitted weekly and any pertinent permanent specimens. He will aid in presentation of cases at weekly ophthalmic pathology conferences. Weight: 1. Every term. *Wadsworth and Klintworth*

OPH-215(C). *Ocular Diseases in Children*. The study of ocular disease in children includes muscular imbalances, congenital disorders, and neoplastic diseases to acquaint the student with a special pediatric and ophthalmologic phase. Weight: 1. Every term. *Chandler*

SUR-221(C). *Surgical Specialties and Ophthalmology*. The student will attend selected conferences of all the surgical specialties and ophthalmology. Additionally he will select two or three of these specialties in which to concentrate experience (on one service at a time) in the operating rooms, clinics, and wards of the V. A. Hospital. Pathophysiology, diagnosis, and treatment will be emphasized. Weight: 8. Every term. *Silver, Chandler, Cole, Malin, Thompson, Urbanic, and Wilkins*

Pathology

Professor T. Kinney, *Chairman*; Professors B. Fetter, D. Hackel, B. Trump, J. Vazquez, F. Vogel; Clinical Professor P. Kotin; Professor Emeritus W. Forbus; Associate Professors P. Burkholder, J. Elchlepp, G. Klintworth, A. Musser, P. Pratt, J. Sommer, B. Wittels; Assistant Professors R. Blaker, W. Bradford, F. Ginn, F. Graybeal, Jr., W. Johnston, N. Ratliff, H. Sage, B. Schlein, G. Spooner, C. Tisher, M. Vazquez; Associates J. Amatulli, M. Britt, J. Wilson

Technical Associates C. Bishop, J. Pickett; Fellows E. Bossen, C. Daniel, D. Graham, J. Hall, R. Howell, H. Jauregui, K. Laiho, W. Mergner, S. Sahaphong, T. Graham; Assistant Residents F. Bastian, R. Buddington, P. Burger, R. Carnighan, J. Daly, D. Denman, J. Gaede, S. Gardanier, E. Kamstock, H. Leonhardt, H. Lin, E. Palmer, M. Quinn, R. Rosier, J. Sheehan, R. Zipf; Interns F. Ayer, J. Burbach, N. Dunn

Required Course

The required course in pathology (PTH-200) is given during the second term of the first year. The fundamentals of pathology are presented to the student by a correlated study of gross and microscopic material illustrating the structural changes in disease. Lectures developing broad concepts of disease processes are given by the members of the senior staff. Conferences with small groups of students under the guidance of a staff member are scheduled for purposes of more intimate discussion. The emphasis is placed on etiology and pathogenesis of disease and the experimental approach to an understanding of disease. The group work is supplemented by weekly conferences involving the class as a whole and dealing with problems presented by current autopsies and with other problems of general importance. Student collaboration in postmortem studies is required. Cases thus studied are presented by the student before the class under the direction of the staff; this takes the form of a clinical-pathologic conference in which each student plays a role.

Elective Courses

PTH-201(B). *The Pathologic Basis for Clinical Medicine*. Disease processes will be studied in terms of organ systems, with the intention of enabling students to crystallize the basic processes studied in Pathology 200. Clinico-pathologic correlation will be stressed, utilizing gross and microscopic examples of disease processes, case studies, lectures, and demonstrations. Weight: 4. Term 1: Sept.-Nov. *Hackel and Staff*

PTH-203(B). *Ophthalmic Pathology*. This course is designed for students with an interest in ophthalmic diseases and particularly for those planning a career in pathology or ophthalmology, and will consist of

lectures, seminars, and laboratory sessions. The normal anatomy and embryology of the eye will be reviewed, and the various reactions of the eye to injury will be studied in gross and microscopic specimens. The more common diseases will be considered in detail. Weight: 3. Term 1: Sept.-Nov. *Klintworth*

PTH-209(B). *Ob-Gyn Pathology and Cytology of Other Body Sites*. This course is designed to explore in detail the role played by clinical exfoliative cytopathology in the diagnosis of disease. Classroom and laboratory work will include diseases involving the female genital tract, upper and lower respiratory tract, urinary tract, body cavities, GI tract, and central nervous system. Emphasis will be on neoplastic disease. Practical application of the acquired knowledge will be made in examining current clinical material. Weight: 3. Term 4: April-May. *Johnston and Staff*

PTH-210(B). *Basic Oncology*. The course consists of three seminars a week conducted by an interdepartmental faculty. Two of the seminars are concerned with the basic aspects of oncology and one with clinical correlates. The student will also work within the supervision of a faculty member in an area germane to the basic problems of cancer. Weight: 8. Terms 1 or 3: Sept.-Nov., Jan.-March. *Johnston and Staff*

PTH-223(B). *Autopsy Pathology*. Students work directly with one or more members of the Pathology Department. They will first assist at autopsies and then perform a limited number of autopsies under supervision. They will be required to work up these cases with particular attention to correlations with clinical and experimental medicine and to present their findings at staff conferences. Weight: 8. Every term. *Staff*

PTH-225(B). *Cardiovascular Pathology*. Clinico-pathologic correlation will be stressed. Cardiovascular disease processes will be studied, reviewing anatomic, embryologic, and physiologic features, and utilizing patient examination and gross and microscopic specimens. Consideration will be given to the electrocardiogram. Weight: 2. Term 1: Sept.-Nov. *Hackel, Estes, Ratliff, and Wilson*

PTH-237(B). *Surgical Pathology*. This course is designed for the student who wishes more experience in the study of disease. Although the course is entitled Surgical Pathology, this does not imply interest solely in the individual oriented to surgery. Problems in dermatology, gynecology, orthopaedics, general surgery, internal medicine, and other specialties will be considered. The program of study will consist of lectures, demonstrations, and laboratory work. Weight: 4. Term 4: April-May. *Fetter*

PTH-342(B). *Special Topics in Pathology*. Special problems in pathology will be studied with a member of the senior staff; the subject matter will be individually arranged. Weight: 1-8 per 9 weeks. Every term. *Kinney and Staff*

PTH-344(B). *Experimental Neoplasia*. Mechanisms of tumor induction, natural history of induced tumors, and basic factors affecting response to cancerogenic stimuli. Weight: 3. Term 4: April-May. *Kotin and Staff*

*PTH-346(B). *Subcellular and Molecular Pathology*. This course is designed for students wishing to broaden their knowledge of cellular structure and cellular pathology. Course consists of a series of lectures and seminars discussing the alterations in cellular structure and associated function that accompany cell injury. Weight: 4 per 18 weeks. Terms 1 and 2: Sept.-Jan. *Trump and Sommer*

PTH-348(B). *Practical Surgical Pathology*. This course will be in the form of an apprenticeship in which the student will become engaged in the actual preparation and diagnosis of tissue changes. Weight: 8. Every term. *Fetter and Staff*

*PTH-352(B). *Biochemical Pathology*. In a series of seminars, the morphology of several disease states will be integrated with their biochemical abnormalities. Utilization of experimental models on resolving the related problems in pathogenesis will be discussed. Disorders in lipid metabolism will be emphasized. Weight: 2. Terms 2 or 3: Nov.-Jan., Jan.-March. *Wittels*

*PTH-353(B). *Advanced Neuropathology*. A systematic coverage of the topographic aspects, the gross characteristics and the cytologic features of human neuropathologic lesions as they bear upon the pathogenesis of the major diseases and have pertinence to their clinical manifestations. Full consideration to research approach. Weight: 3. Term 1: Sept.-Nov. *Vogel and Klintworth*

PTH-359(B). *Instrumentation in Ultrastructural Pathology*. Emphasis will be placed on the theory and application of electron microscopy to ultrastructural pathology. The methods relating to electron microscopy as well as phase and polarization microscopy will be considered. Weight: 4. Terms 3 and 4: Jan.-May. *Trump and Staff*

PTH-362(B). *Pathology of the Kidney*. This course will be a comprehensive study of pathological and clinical features of the glomerulonephritides, nephrotic syndrome, nephroses, and pyelonephritis as well as of metabolic, congenital, and neoplastic renal disorders. Lectures will be supplemented with gross and microscopic specimens, demonstrations, and special library studies. Weight: 2. Term 2: Nov.-Jan. *Burkholder*

PTH-364(B). *Orthopaedic Pathology*. Special problems in orthopaedic pathology will be dealt with beginning with a discussion of the development of connective tissue with special emphasis on bone and muscle. Bone tumors, metabolic diseases and traumatic problems will be considered. Weight: 2. Term 4: April-May. *Sommer and Mathews*

PTH-366(B). *Pulmonary Pathology and Postmortem Pathophysiology*. Emphasis will be on pulmonary pathology and pathophysiology of infectious, metabolic, environmental and neoplastic diseases, and certain

diseases of unknown etiology (e.g., sarcoid, alveolar proteinosis, etc.). Ventilatory experiments will be done on excised human lungs. Weight:

3. Term 1: Sept.-Nov. *Pratt*

PTH-368(B). *Neonatal and Pediatric Pathology*. A systematic study of disease processes involving placenta, infant, and child. Seminars will emphasize pathologic physiology and clinical-pathologic correlations. Laboratory periods will emphasize gross and microscopic material. Designed for students entering clinical pediatrics and pathology. Weight:

3. Term 2: Nov.-Jan. *Bradford and Martha Vazquez*

PTH-370(B). *Use of a Central Clinical Laboratory in Laboratory Medicine*. Emphasis will be on clinical-pathologic correlation between laboratory findings and disease processes. Shortcomings and benefits derived from rational and critical utilization of laboratory procedures will be considered. There will be conference and laboratory periods. Quality control, "normal values," sources of error, mass screening procedures, battery testing, newer procedures, and others will be considered. Weight:

3. Term 2: Nov.-Jan. *Musser, Spooner, Schlein, and Blaker*

PTH-372(B). *Introduction to Diseases due to Environmental Agents*. This course comes to grips by a series of dialogues with the biological effects of environmental agents pertinent to human disease and the conservation of health. The patterns of host response and the mechanisms of damage and detoxification and interactions will be discussed for prototype agents. Examples will include silica, air pollution, cigarette smoke, aflatoxin, cyclamate, the Pill, fluoride, DDT, dieldrin, paraquat, "pot," and "acid." Research needed and career opportunities will be discussed. Weight: 2. Terms 1 and 3: Sept.-Nov., Jan.-March. *Vazquez, Kilburn, Dowell, Pratt, Cate, Kamin, and Narahashi*

PTH-374(B). *Pulmonary Structure and Function Seminar*. Current and exemplary pathological material on lungs including gross, histologic, and electron microscopic data is correlated with in vitro function and clinical features, physiological measurements, and roentgenographic findings. The structural features of the types of reaction of lung cells to injury are interpreted against this background. Such demonstration material is correlated by lectures. Weight: 1. Every term. *Pratt and Kilburn*

Pediatrics

Professor Samuel L. Katz, *Chairman*; Professors J. M. Arena, S. C. Dees, J. S. Harris, A. M. McBryde, J. B. Sidbury, Jr., M. S. Spach; Professor Emeritus W. C. Davison; Clinical Professor A. H. London, Jr.; Associate Professors J. P. Boineau, W. J. A. DeMaria, M. Kinsbourne, D. J. Lang, F. S. Porter, D. Silver, A. Spock; Associate Clinical Professors W. L.

London, H. G. Noller, T. D. Scurletis; Assistant Professors R. C. Barr (Ph.D.), G. W. Brumley, Jr., R. H. Buckely, R. V. Canent, M. P. Capp, J. A. Fowler, T. P. Graham, Jr., J. F. Griffith, H. J. Harris, L. Hohman, M. D. Jarmakani, G. M. Lyon, Jr., T. L. Peele, A. W. Renuart, C. M. Wilfert; Assistant Clinical Professors J. T. King, D. B. Shearin, B. Webb; Associates W. D. Bradford, P. H. Jewett, J. D. Jones, T. D. King, R. P. Krueger, D. S. Leventhal (Ph.D.), E. C. Long, S. K. Osterhout, L. A. Pounds, C. Roe, C. Taylor; Clinical Associates W. A. Cleland, C. B. Neal, III, A. D. Rice, G. A. Watson, Jr.; *Clinical Instructors in Pediatrics* C. A. Bailey, Jr., N. S. Moseley, B. S. Skinner, J. W. Whatley, Jr.; *Instructor in Pediatrics* S. K. Zirkle; *Fellows* C. A. Alexander, G. F. Atwood, R. R. Burns, B. F. Hinton, A. T. Johnson, Jr., M. H. Rourk, Jr., V. D. Rowe, D. P. Schwartz, R. J. Snowe; *Chief Resident* H. P. Boggess; *Residents* B. J. M. Cruikshank, D. C. Fischer, M. Frecking, V. B. Giordano, J. Kat-twinkel, D. W. Kredich, P. C. Latkin, E. B. Lewin, A. H. Lubin, R. N. Marshall, Jr., F. C. Norcross, M. A. Sisk, J. N. Woody; *Interns* S. J. Aita, III, R. J. Boucek, Jr., J. A. Cheek*, J. D. Cook, J. C. Edlin, D. E. Goldstein, G. K. Goodenough, R. C. Haberkern, B. B. Levie, E. S. Martin, M. A. Passero, J. C. Rowe, J. R. Silvio, C. D. Smith, III

Required Course

The basic course in pediatrics (PED-200) consists of seven weeks during the second year, divided between clinic and ward services. Students participate in the morning subspecialty clinics and afternoon general pediatric clinics, seeing both new and return patients. Conferences are held in connection with the specialty clinics. There are conferences in the general pediatric clinic with informal presentation and discussion of patients. On the wards, the students function as clinical clerks and are assigned patients in rotation. They make daily rounds with the staff; the different subspecialty groups make ward rounds weekly. A joint conference with the senior and resident staff is held twice weekly on topics of pediatric interest, clinical-pathologic discussions, case presentation, and for guest lecturers. There is a daily radiology conference at which the interesting cases are presented and discussed with the radiologist; a weekly pediatric-pathology conference with all surgical and autopsy material reviewed; and weekly grand rounds.

Elective Courses

PED-201(C). *General Pediatrics*. Student is assigned to the wards, clinics, and newborn nursery according to his interest and goals. In general, he will have an apprenticeship in pediatrics with learning experiences stemming directly from the patient and his problems. Weight: 8. Every term. *Katz and Pediatric Staff*

*Cheek, J. Allan—As of January 1, 1970, he will be a first year resident.

PED-203(C). *Pediatric Neurology*. Student will examine patients with neurological and convulsive disorders in the wards and clinics of Duke Hospital and in the inpatient facilities of the Murdoch Center. Students will be given the opportunity to do research with the staff members. Weight: 8. Terms 2 and 4: Nov.-Jan., March-May. *Kinsbourne, Renuart, and Staff*

PED-204(C). *Convulsive Disorders and Mental Retardation*. Patients in Duke Hospital and Murdoch Center. Screening procedures in the evaluation of patients with mental retardation and/or other neurologic disorders. Medical psychological, social, and educational aspects of mental retardation. Weight: 8. Every term. *Renuart*

PED-209(C). *Pediatric Endocrinology*. Student sees clinical endocrine patients by participation in Pediatric-Endocrine Clinics. Stress is placed upon application of hormone assay to the diagnosis of endocrine disorders in childhood. Weight: 8. Every term. *Sidbury*

PED-215(C). *Metabolic Disorders in Children*. Outpatient and inpatient study of a variety of metabolic disorders. Weight: 8. Every term. *Sidbury*

PED-217(C). *Pediatric Hematology*. Includes all aspects of clinical and laboratory pediatric hematology with emphasis on fundamental concepts as related to hematologic disorders. There will be daily ward rounds, a weekly clinic, weekly slide conferences, and weekly seminars, as well as assigned reading. Students will be encouraged to engage in some individual clinical or laboratory project during the period of the course. Weight: 8. Every term. *Porter*

PED-221(C). *Poison Control*. Student participates in the clinical functions of the Poison Control Center. He will be on call for the treatment of these cases in the Emergency Room or ward. He will discuss each case with the Director. Two hourly conference sessions per week will be scheduled. Weight: 2. Terms 1, 2, 3, and 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Arena and Osterhout*

PED-223(C). *Preceptorship in Pediatrics*. This course gives insight into the management of pediatric practice especially as related to infancy. Experience with a practicing pediatrician will be provided. Students will be expected to participate in newborn and premature rounds at Duke and Watts Hospitals, in well-baby conferences, and in the High Risk Prenatal Clinic. Weight: 6. Terms 2 or 3: Nov.-Jan., Jan.-March. *McBryde, A. London, W. London, and Staff*

PED-225(C). *Neonatology*. Students will have patient care responsibilities and experience in the Full Term Newborn and Intensive Care Nurseries. Included will be discussions of prenatal hazards, resuscitation, care of the normal newborn and premature infant. Emphasis is placed on the initiation of parent-child relationships, breast feeding and the management of the normal and stressed neonate. Weight: 8. Term 3 or summer term: Jan.-March, summer. *McBryde and Brumley*

PED-227(C). *Behavioral Aspects of Pediatric Illness*. The purpose of this course is to introduce the student to the emotional aspects of sick children. Experience will include the impact on the family as well as the psychic and somatic adjustments of the child. Weight: 3. Every term. *Jones, Taylor, and Leventhal*

PED-231(C). *Clinical Pediatric Cardiology*. Provides an intensive learning experience in clinical childhood heart disease. Scope: history, physical examination, and special techniques (electrocardiography, phonocardiography, vectorcardiography, cardiac catheterization, and cineangiography). Weight: 8. Every term. *Canent and Staff*

PED-233(C). *Allergy, Clinical Immunology, and Pulmonary Diseases*. Clinical evaluation and practice in use of methods of diagnosis and treatment of allergic disorders, cystic fibrosis and other pulmonary diseases, immunologic deficiency states, and autoimmune disorders. Scope: history, physical examination, skin and pulmonary function tests, allergen preparation, sweat testing, and a variety of clinical immunologic tests. Weight: 8. Every term. *S. Dees, R. Buckley, and Spock*

PED-235(C). *Pediatric Oncology*. The student will attend daily ward rounds, a weekly conference, and seminars. He will also participate in the diagnostic evaluation, care, and treatment of patients with malignant diseases. The majority of the student's time will be spent in an individual clinical or laboratory investigative effort. The exact nature of this project will be determined by the interest and capabilities of the student. Weight: 8. Every term. *Lyon*

PED-239(C). *Perinatal Medicine*. A study of factors during pregnancy, labor, delivery, and the first month of life. Emphasis will be placed on teratogenic influences, abnormal conditions of pregnancy as related to the infant, prenatal pathological conditions adversely afflicting the fetus and newborn, and early management of the infant. Current problems in maternal-fetal relationships will be outlined. Weight: 8. Terms 1 or 4: Sept.-Nov., March-May. *Brumley and Crenshaw*

PED-241(C). *Pediatric Nephrology*. Course is designed to provide experience in diagnosis, natural history, and treatment of acute and chronic disorders of the kidney in children. Students are also exposed to the management of fluid and electrolyte disorders in infants and children. Weight: 6-8. Every term. *DeMaria and Krueger*

MED-208(C). *Cognitive Neurology*. The syndromes arising from focal cerebral damage studied at bedside and by experimental psychological methods. Emphasis on detailed analysis of disturbed cerebral function (aphasia, agnosia, etc.) Comparable methods used to study children with reading and writing difficulties. Instruction will be given in experimental psychological techniques. Students assigned to ongoing research projects. Weight: 4-8. Terms 1 and 3: Sept.-Nov., Jan.-March. *Kinsbourne*

SUR-291(C). *Cancer: CHS, MED, MIC, OBG, PED, PTH, RAD, and*

SUR aspects. Taught by an interdepartmental faculty, course consists of seminars in clinical and related basic aspects of oncology (6 hour week); cas presentation conferences (2 hour week); and ward and clinic experiences in diagnosis and treatment (remaining time). The student elects one clinical department for the ward and clinic experiences. Weight: 2-8. Terms 1 and 3: Sept.-Nov., Jan.-March. Shingleton, Cavanaugh, Heyden, Johnston, Joklik, Laszlo, and Porter

Physiology and Pharmacology

Professor D. C. Tosteson, *Chairman*; Professor T. Narahashi, *Head of Division of Physiology*; Professor R. Bressler, *Head of the Division of Pharmacology*; Professor J. W. Moore, *Leader of Engineering Physiology Group*; Associate Professor George M. Padilla, *Director of Graduate Studies*; Assistant Professor R. E. Fellows, *Director of Medical Studies*; *Division of Physiology: Laboratory of Cardiopulmonary Physiology*: Associate Professor J. V. Salzano, *Chief of Laboratory*; *Laboratory of Molecular Endocrinology*: Assistant Professor R. Fellows, *Chief of Laboratory*; *Laboratory of Cellular Physiology*: Associate Professor T. J. McManus, *Chief of Laboratory*; *Laboratory of Membrane Physiology and Pharmacology*: Professor D. C. Tosteson, *Chief of Laboratory*; Visiting Professor B. Ginzburg; Assistant Professor B. Gisin; Research Associates M. Ginzburg, R. Gunn, G. Kirk, P. Shrager, M. Tosteson; *Laboratory of Membrane Immunophysiology*: Assistant Professor P. Lauf, *Chief of Laboratory*; Research Associate J. Snyder; *Laboratory of Integrative Neurophysiology*: Associate Professor G. Somjen, *Chief of Laboratory*, Associate C. Gerber; *Laboratory of Neural Development and Function*: Assistant Professor L. Mendell, *Chief of Laboratory*; *Laboratory of Molecular Physiology*: Professor J. Blum, *Chief of Laboratory*; Professor G. Padilla, Research Associates V. Kahn, R. Connett; *Laboratory of Cellular Energetics*: Professor F. Jobsis, *Chief of Laboratory*; Assistant Professor S. Hersey; Research Associate M. Rosenthal; *Laboratory of Cellular Neuropharmacology and Toxicology*: Professor T. Narahashi, *Chief of Laboratory*; Research Associates J. Abbott, T. Deguchi, K. Murayama, C. Wang, W. Kem; *Laboratory of Circulatory Physiology and Pharmacology*: Professor E. Renkin, *Chief of Laboratory*; Assistant Professor E. Mills, Research Associates M. Kampp, R. Anderson; *Laboratory of Marine Membrane Physiology*: Assistant Professor J. Gutknecht, *Chief of Laboratory*; Visiting Professor E. Schoffeniels; *Laboratory of Sensory Biophysics*: Associate Professor M. Wolbarsht, *Chief of Laboratory*; *Laboratory of Materno-Fetal Physiology*: Assistant Professor D. Schomberg, *Chief of Laboratory*; *Laboratory of Hyperbaric Physiology*: Professor R. Brauer, *Chief of Laboratory*; *Laboratory of Reproductive Physiology*: Assistant

Professor N. Anderson; Research Associate F. Ramon; *Laboratory of Cardiac Cellular Physiology and Pharmacology*: Professor E. A. Johnson, Chief of Laboratory; Assistant Professor M. Lieberman; Research Associate L. Harrington; *Laboratory of Cellular Neurophysiology*: Professor J. Moore, Chief of Laboratory; *Laboratory of Neural Networks*: Assistant Professor H. Wachtel, Chief of Laboratory

Engineering Physiology Group: Assistant Professor N. Anderson; Professor E. A. Johnson; Assistant Professor M. Lieberman; Professor J. W. Moore; Assistant Professor H. Wachtel

Clinical Physiology Group: Assistant Professor J. Greenfield (Medicine); Assistant Professor J. Kylstra (Medicine); Assistant Professor A. Wallace (Medicine); Assistant Professor D. Schomberg (Ob-Gyn); Associate Professor M. Wolbarsht (Ophthalmology); Assistant Professor H. Lebovitz (Medicine)

Division of Pharmacology. Laboratory of Metabolic Pharmacology: Professor R. Bressler, Chief of Laboratory; Assistant Professor K. Brendell; Assistant Professor E. Meezan; *Laboratory of Biochemical Pharmacology*: Professor F. Bernheim, Chief of Laboratory; Associate Professor A. Ottolenghi; *Laboratory of Cellular Pharmacology*: Assistant Professor H. Elford, Chief of Laboratory; Assistant Professor E. Baril; *Laboratory of Molecular Pharmacology*: Associate Professor L. Lack, Chief of Laboratory; *Laboratory of Myocardial Pharmacology*: Assistant Professor M. Entman, Chief of Laboratory; *Laboratory of Neuropharmacology*: Associate Professor S. Schanberg, Chief of Laboratory; Assistant Professor R. Friedel; Research Associates T. R. Anderson, A. Itoh; *Laboratory of Chemistry and Life Sciences*: Assistant Professor K. Palmer, Chief of Laboratory; *Laboratory of Pharmacology and Toxicology*: Associate Professor H. Posner, Chief of Laboratory

Required Course

The required course in physiology (PHS-200) consists of lectures, seminars, and laboratory exercises offered by all members of the physiology staff during the fall term of the first year. The core course in pharmacology (PHS-202) consists of lectures, seminars, and laboratories offered by all members of the pharmacology staff during the second term of the first year. These courses emphasize those facts and general principles of physiology and pharmacology which all medical students should learn no matter which of the many careers in medicine and the medical sciences they may choose to pursue.

Elective Courses

PHS-219(B). *Tutorial in Physiology and Pharmacology*. Guided independent study of original literature and/or laboratory experience. Re-

quired of all third year medical students who elect to concentrate in this department. Weight: 3 per 9 weeks. Terms 1, 2, 3, and 4: Sept.-Jan., Jan.-May. *Fellows and Staff*

*PHS-258(B). *Environmental and Underwater Physiology and Pharmacology*. General physiological problems involved in penetration of man into the ocean including confinement, cold, exotic atmospheres, pharmacology, and mechanical aspects of respiration at high pressures, inert gas narcosis, prolonged immersion, and effects of pressure on nerve and contractile tissue. Weight: 9. Summer term: June-Aug. *Brauer and Staff*

*PHS-372(B). *Research in Physiology and Pharmacology*. Laboratory investigation in various areas of physiology and pharmacology. Weight: 2-8 per 9 weeks. Terms 1 and 2 or 3 and 4; summer term: Sept.-Jan., Jan.-May. *Fellows and Staff*

*PHS-383(B). *Physiological Instrumentation*. Electronic methods of measurement of physiological variables. The operational amplifier is used as the active building block in appropriate feedback circuits containing only passive elements to make a wide range of linear instruments including analog computers. Digital logic and computing elements are also developed. Weight: 1½ per 9 weeks. Terms 3 and 4: spring semester. *Moore*

*PHS-387(B). *Cardiovascular and Respiratory Physiology and Pharmacology I*. Selected topics in the physiology and pharmacology of cardiac muscle and the peripheral circulation, including general and comparative morphology and ultrastructure of cardiac muscle, some aspects of developmental physiology, cardiac electrophysiology and mechanics, excitation-contraction coupling, and peripheral circulatory control. Weight: 1 per 9 weeks. Terms 1 and 2: Sept.-Jan. *Johnson and Staff*

*PHS-389(B). *Cardiovascular and Respiratory Physiology and Pharmacology II*. Primary emphasis is on various aspects of the physiology of respiration. Topics covered include pulmonary mechanics, central and peripheral regulation of ventilation, pulmonary circulation, and respiratory responses to exercise, altitude, and hyperbaric environments. Weight: 1 per 9 weeks. Terms 3 and 4: Jan.-May. *Salzano and Staff*

*PHS-391(B). *Neurophysiology and Neuropharmacology I*. Structure and function of excitable membranes; impulse generation and conduction in different kinds of nerve; effects of pharmacological agents on electrical properties; physiological and pharmacological aspects of synaptic and neuromuscular transmission; biophysics of receptor cells. Clinical applications will be discussed. Weight: 1½ per 9 weeks. Terms 1 and 2: Sept.-Jan. *Narahashi and Staff*

*PHS-393(B). *Neurophysiology and Neuropharmacology II*. Physiology of sense organs; sensory coding in the CNS; integration in simple neural nets; motor functions of the CNS; effects of drugs on central neural function; physiological aspects of memory. Clinical applications

will be discussed. Weight: 1½ per 9 weeks. Terms 3 and 4: Jan.-May. *Somjen and Staff*

*PHS-394(B). *Marine Membrane Physiology*. Physiology of marine and estuarine organisms, with emphasis on cellular transport processes. The course will include the mechanisms, functions, and comparative aspects of ionic and osmotic regulation in marine plants and animals. Weight: 9. Summer term. *Gutknecht, Schoffeniels, and Staff*

*PHS-395(B). *Biochemical Pharmacology I*. The courses will emphasize mechanism of action of drugs in the areas of (1) metabolism and toxicology; (2) antibiotics; (3) steroids; (4) antimetabolites and oncolytic agents; (5) embryology and development; (6) hematopoietic system and porphyrins; (7) lipids and carbohydrates; (8) membrane structure and function; (9) ground substance (mesenchyme). Three of the above topics will be covered in the course each year. The lectures will correlate the material in terms of clinical significance. Weight: 1 per 9 weeks. Terms 1 and 2: Fall semester. *Bressler, Brendel, Lack, Palmer, Posner, Elford, Kirschner, and Kamin*

*PHS-396(B). *Biochemical Pharmacology II*. The courses will emphasize mechanism of action of drugs in the areas of (1) metabolism and toxicology; (2) antibiotics; (3) steroids; (4) antimetabolites and oncolytic agents; (5) embryology and development; (6) hematopoietic system and porphyrins; (7) lipids and carbohydrates; (8) membrane structure and function; (9) ground substance (mesenchyme). Three of the above topics (not covered in PHS-395B) will be covered on the course each year. The lectures will correlate the material in terms of clinical significance. Weight: 1 per 9 weeks. Terms 3 and 4: spring semester. *Bressler, Brendel, Lack, Meezan, Posner, Kirschner, and Kamin*

*PHS-397(B). *Cellular and Chemical Pharmacology I*. Chemical aspects of cell-drug interaction. Structure activity relationships. Drug action on complex biological systems. Weight: 1 per 9 weeks. Terms 1 and 2: fall semester. *Ottolenghi and Wilder*

*PHS-398(B). *Cellular and Chemical Pharmacology II*. Cholinergic mechanisms—pharmacological and applied aspects. Biogenic amines—pharmacological and behavioral aspects and their relationship to disease. Psychoactive drugs. Pharmacology of excitable tissues. Weight: 1 per 9 weeks. Terms 3 and 4: Spring semester. *Ottolenghi, Bernheim, Narahashi, and Schanberg*

*PHS-401(B). *Metabolic and Developmental Physiology and Pharmacology*. Cell division and control of the cell cycle; population dynamics; physiology of subcellular organelles such as nuclei, mitochondria, lysosomes, and peroxisomes; metabolic regulation with respect to temperature adaptation and to variations in exogenous substrates; control of development and differentiation in eucaryotic cells. Weight: 1½ per 9 weeks. Terms 1 and 2: Sept.-Jan. *Blum, Padilla, and Staff*

*PHS-403(B). *Endocrinology and Reproduction*. Current concepts of biosynthesis, secretion, and mechanisms of action of hormones. Structural relationships and endocrine regulation at cellular, organ, and higher integrative levels. Structure and function of male and female reproduction systems including hormonal mechanisms in pregnancy and parturition. (Also listed as *ANA-403(B).) Weight: 1½ per 9 weeks. Terms 3 and 4: Jan.-May. *Fellows, Everett, and Anderson*

*PHS-405(B). *Contractile Processes in Physiology and Pharmacology*. Cellular basis of activity in skeletal, cardiac, and smooth muscle; sub-microscopic structure of muscle and the molecular basis of contraction; electrical and ionic properties of muscle membranes; the problem of electro-mechanical coupling; mechanics and thermodynamics of muscular contraction; biochemical energetics of contraction. Weight: 1½ per 9 weeks. Terms 1 and 2: Sept.-Jan. *Jöbsis and Johnson*

*PHS-407(B). *Membrane Transport Processes in Physiology and Pharmacology I*. Chemical composition and ultrastructure of biological membranes, physical chemistry of transport processes, use of drugs to modify and elucidate membrane transport processes, role of such processes in physiology of individual cells, integration of transport processes to produce movement of molecules across epithelia, e.g., amphibian skin and bladder. Weight: 1 per 9 weeks. Terms 1 and 2: Sept.-Jan. *Tosteson and Staff*

*PHS-409(B). *Membrane Transport Processes in Physiology and Pharmacology II*. The function of organs specialized for transport, such as the gastric and intestinal mucosa, the liver and the kidney, in terms of the facts and concepts of membrane physiology. Weight: 1 per 9 weeks. Terms 3 and 4: Jan.-May. *Tosteson and Staff*

Psychiatry

Professor E. Busse, *Chairman*; Professors I. Alexander, J. Altrocchi, K. Back, L. Borstelmann, B. Bressler, R. Carson, C. Eisdorfer, J. Fowler, M. Lakin, H. Lowenbach, G. Maddox, J. McKinney, W. Obrist, J. Rhoads, W. Wilson; Professor Emeritus L. Hohman; Associate Professors M. Breslin, E. Clifford, H. Crovitz, B. Feather, C. Erwin, I. Gehman, R. Green, H. Harris, P. Hein, F. Hine, A. Krugman, C. Llewellyn, D. Mayfield, E. Palmore, E. Pfeiffer, J. Reckless, G. Silver, L. Thompson, A. Verwoerd; Assistant Professors W. Anderson, M. Baldwin, K. Barclay, M. Brehm, E. Crovitz, E. Ellinwood, D. Fowler, W. Gentry, D. Gianturco, J. Giragos, M. Huse, J. Jackson, D. Johnson, J. Jones, C. Keith, I. Kremen, M. LaBarre, D. Leventhal, J. Mallory, J. Martin, C. Neville, Z. Pauk, E. Reilly, W. Rockwell, M. Short, W. Shows, R. Tomlinson, H. Wang, M. Wertz, S. Workman, W. Zung; Assistant Clinical Professor P. Irigaray;

Associates M. Amaya, H. Coppedge, C. Driscoll, J. Gallemore, E. Harkins, R. Kerr, P. Kirwin, G. Marsh, D. Peak, G. Polansky, A. Sagberg, C. Taylor, P. Walker; Clinical Associate in Therapeutic Education, L. Davis
Instructors J. Bannerman, M. Clark, E. Crocker, T. Fox, G. Guajardo, T. Haizlip, P. Hall, F. Harrison, E. Heath, A. Jackson, H. Johnson, F. Martin, R. Martin, J. McNiell, N. Pfeiffer, M. Reedy, D. Robinson, S. Singleton, J. Smalley, K. Thompson, A. Whanger, J. Williams; *Research Associates* F. Jeffers, F. Wilkie; Assistant D. Heyman; Consultant W. LaBarre; *Fellows* E. Allen, B. Anderson, J. Berryhill, R. Chapman, R. Demas, A. Derdeyn, M. Fisher, M. Elias, A. Grant, S. Hastings, M. Headrick, B. Hydrick, D. Jeffrey, P. Kral, J. Monahan, R. Morris, L. Potts, P. Prinz, D. Rosof, P. Scagnelli, R. Schlossel, K. Stewart, A. Sudilovsky, L. Van Egeren, R. Varner, M. Worchel; *Chief Resident* J. Nash; *Residents* A. Carter, S. Davis, R. Friedel, R. Kennan, S. Lee, L. Lowenbergh, C. Norton, R. Ray, K. Stevenson; *Assistant Residents* D. Allen, M. Benway, G. Brown, R. Burbach, R. Fisher, G. Freedman, J. Gergen, W. Gray, E. Hammett, D. Hawkins, G. Jackson, J. Johnson, L. Lipsius, S. Morrison, J. Shalley, M. Volow; *Psychology Interns* D. Adams, K. Blankstein, J. DeVoge, R. Finn, L. Lothstein, M. Nichols

Required Courses

Human Behavior and Psychiatry

In addition to required and elective courses in clinical psychiatry this department offers, through its Division of Human Behavior, course work in the biological and behavioral sciences which form the bases of psychiatry and the psychological aspects of medicine.

During the first year, 60 hours are devoted to human behavior (PSY-200). A lecture series introduces the student to the concepts, techniques, and data of the various sciences most relevant to an understanding of human behavior, thus providing a multifaceted approach to that understanding. Lecturers from the fields of behavioral psychology, psychiatry, pediatrics, and sociology discuss behavior from the points of view of heredity and constitution; the central and autonomic nervous systems; inner emotional conflicts and interpersonal relationships; learning, cognition, and perception; and relationships between the individual and his family, the social institutions, and his subculture and culture. Both functional and developmental points of view are presented and, in connection with the latter, stages in the development of the individual personality are traced. Wherever possible, relationships between the various approaches to human behavior are stressed. Concurrent with the lectures, a series of small group meetings provide, through the interviewing of patients and group discussion, opportunity for the further assimilation of the lecture material and its application to specific examples of be-

havior. The small groups also provide opportunities to introduce effective techniques of human interaction and observation of the primary data of human behavior as well as methods of recording and interpreting these observations. In both the didactic and small group laboratory portions of the course, emphasis is placed upon the complementarity of the biological and psychosocial approaches to human behavior and the relevance of such a combined approach for the practice of medicine.

The required second year course in clinical psychiatry (PSY-201) is for seven weeks. The student assumes limited responsibility, under supervision, for diagnosis and treatment of patients on the psychiatric wards, in the psychiatric outpatient clinic, and (through the psychosomatic consultation services) on the non-psychiatric wards of the hospitals. Supervision is directed toward two principle areas. The first is the significant application of concepts of diagnosis, psychopathological formulation, and therapy. Concepts in these areas are drawn from both the descriptive-organic-directive and the psychoanalytic-psychosocial-psychotherapeutic contributions to current psychiatric thought. Secondly, supervision is aimed at further developing interpersonal techniques of sensitive observation and therapeutic use of the self. Emphasis is placed upon concepts and techniques applicable to all patients as well as those specifically designated *psychiatric*. Didactic instruction includes seminars on the principle neurotic conditions (symptomatic, characterological, and psychophysiological), the major psychoses, emotional problems of childhood, the somatic therapies, and introductory electroencephalography. In addition to rounds and case conferences, students are encouraged to observe psychotherapy and participate in supervised psychotherapeutic encounters whenever appropriate situations can be provided.

Elective Courses

PSC-202(B). *Philosophy of Science and Behavioral Sciences*. Survey of current theories of knowledge, particularly as they relate to the special complex problems of empirical meaning, objectivity, measurement, and verification in studies of human behavior. Consideration is also given to the mind-body problem. Weight: 1. Term 2: Nov.-Jan. *Hine*

PSC-203(B). *Experimental Design in Behavioral Research*. Discussion of research strategies in behavioral and social sciences. Particular emphasis will be placed upon the design analysis and criticism of experimental design as it applies to behavioral research with a focus upon the validity of research findings and their generalizability. Weight: 1. Term 3: Jan.-March. *Carson*

PSC-206(B). *Theoretical Basis for Group Psychotherapy and Group Processes*. A seminar that will examine the differing yet complementary hypotheses of human behavior in groups. Weight: 2. Term 2: Nov.-Jan. *Reckless and Staff*

PSC-213(B). *Human Development I: Birth-Adolescence*. A survey of psychological development from birth to adolescence in terms of sequential emergence of major behavioral systems. May be taken in conjunction with PSC-276(C). Weight: 2. Terms 1 and 3: Sept.-Nov., Jan.-March. *Borstlemaann and Staff*

PSC-214(B). *Human Development II: Adolescence to Old Age*. The changes in human development and personality due to biologic maturation and the influences of experience will be covered with opportunities to observe types of personalities reacting to various settings. May be taken in conjunction with PSC-337(C). Weight: 2. Terms 2 or 4: Nov.-Jan., March-May. *Maddox and Busse*

PSC-215(B). *Comparative Personality Theory*. An examination of models of human functioning from Freud to the present. Topics will include examples from psychoanalytic, interpersonal, field theoretical, and behavioristic approaches. Weight: 1. Term 3: Jan.-March. *Crovitz and Krugman*

PSC-216(B). *Intelligence and Cognition*. Description of role of intelligence and cognition in behavior. Theories of intellectual functioning. Introduction to measurement of abilities. Effects of genetics, experience, age, and illness upon intelligence. Weight: 2. Term 4: March-May. *Gentry*

PSC-250(B). *The Neural Substrates of Perception and Cognition*. An introduction to the neurophysiological basis of perception and thinking. Sensory systems, attention and appetitive systems, cerebral cortical function and programming as inferred from lesions in humans and from animal experimentation will be reviewed. Weight: 1. Term 2: Nov.-Jan. *Ellinwood and Marsh*

PSC-289(B). *Autonomic Conditioning and Psychophysiologic Methods*. Analysis of conditioning of autonomic nervous system functioning in man and an introduction to laboratory methods of psychophysiology and survey of approaches. May be taken in conjunction with PSC-245(C). Weight: 2. Term 2: Nov.-Jan. *P. Hein*

PSC-293(B). *Learning Theory and Psychopathology*. An understanding of learning theory as applied to human behavior and its normal and pathologic aspects. Weight: 2. Term 3: Jan.-March. *Feather*

PSC-295(B). *Anatomical Basis of Mind*. The first half of the course will be a systematic review of neuroanatomy along phylogenetical lines of functional organization. There will be integration of neuroanatomical systems that have been implicated in the elaboration of higher mental activities, so that the last portion of the course will correlate topics on emotion, drive, sleep, arousal, memory, learning, intelligence, etc. with current neuroanatomical research. Weight: 2. Term 1: Sept.-Nov. *Short*

PSC-297(B). *Biochemistry of Behavior*. This course will cover the chemical structure of nervous tissue, neurohumors, hormonal regulation,

psychoactive agents, biochemical genetics, and biochemistry of behavior. Weight: 2. Term 3: Jan.-March. *Short*

PSC-299(B). *Preceptorship in Behavioral Science*. Opportunity for the student to work closely with a member of the faculty in an area of mutual interest with emphasis upon research. Weight: 1-8. Term: Every term. *Feather and Staff*

PSC-301(B). *Psychophysiology Seminar*. Ongoing seminar in special topics in autonomic nervous system research. Weight: 1. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, April-May. *P. Hein and Staff*

PSC-303(B). *Mental Retardation*. A consideration of early child development from the psychological point of view, focusing on mental retardation. Implications for medical practice, education, research, and program development. Weight: 2. Terms 1 and 3: Sept.-Nov., Jan.-March. *Leventhal*

PSC-305(B). *Social and Cultural Aspects of Illness*. Seminar on medical-social roles in community and hospital. Topics include physician-patient relationship; epidemiology of illness and health services in terms of ecology, social stratification, race, life cycle. Students wishing further work in one particular topic, such as Negro-subculture or gerontology, should take PSY-299(B) specifying particular interest. May be taken in conjunction with PSC-230(C), PSC-251(C). Weight: 3. Term 4: March-May. *Maddox, Palmore, and Jackson*

PSC-321(B). *Neurophysiology and Behavior*. Fundamentals of brain and spinal cord physiology as they relate to function of the mind. Attention is paid to consciousness, intellect, emotion and psychomotor activity. May be taken in conjunction with PSC-259(C). Weight: 2. Term 2: Nov.-Jan. *Wilson*

PSC-323(B). *Basis of Behavioral Pharmacology*. Fundamental pharmacology of centrally acting drugs that influence behavior. Emphasis on basic pharmacologic acting of drugs as they influence biochemical and neurophysiological function of nervous system. May take in conjunction with PSC-234(C). Weight: 2. Term 4: March-May. *Wilson, Reilly, Ellinwood, and Short*

PSC-230(C). *Clinical Research Preceptorship in Community Psychiatry*. The course will focus upon the evaluation of such community mental health problems as alcoholism and suicide and mental illness and the clinical techniques used to correct these conditions. Students will be assigned to one of the staff for their field experience. Weight: 3. Every term. *Eisdorfer, Maddox, B. Fowler, Lowenbach, Shows, and Giragos*

PSC-234(C). *Clinical and Experimental Psychopharmacology*. Experience in one or more areas of psychopharmacology including clinical use of drugs, human experimental psychopharmacology, and animal neuropharmacology. Lectures covering mechanisms of action and clinical use of psychoactive drugs. Weight: 3. Term 3 or summer term: Jan.-March, June-Aug. *Mayfield, Ellinwood, Short, and Wilson*

PSC-240(C). *Inpatient Psychiatry: Environmental and Somatic Therapy (A)*. Intensive clinical course—diagnosis, treatment, and management methods. Patient care responsibilities including management of ward milieu and experience with somatic, individual and group psychotherapy. Student given more clinical responsibility than in sophomore year. If desired, may arrange for special reading tutorial in related topics, e.g., schizophrenia. Weight: 8. Every term. *Green and F. Hine*

PSC-241(C). *Inpatient Psychiatry: Environmental and Somatic Therapy (B)*. Less individual patient responsibility than PSC-240(C). Diagnosis, psychodynamics, and treatment emphasized. Student given more clinical responsibility than in sophomore year. If desired may arrange for special reading tutorial in related topics, e.g., schizophrenia. Weight: 6. Every term. *Green and F. Hine*

PSC-242(C). *Inpatient Psychiatry: Environmental and Somatic Therapy (C)*. Selected patient conferences and didactic lectures. Student is given more clinical responsibility than in sophomore year. If desired, student may arrange for special reading tutorial in related topics, e.g., schizophrenia. Weight: 3. Every term. *Green and F. Hine*

PSC-243(C). *Principles and Practice of Outpatient Psychiatry*. Training and experience in recognizing and treating emotional disorders in outpatients. Supervised experience with patients having emotional problems commonly seen in medical practice. Training to include theory and techniques of brief psychotherapy, crisis intervention, supportive psychotherapy, and utilization of community resources, both at Duke Hospital and neighboring agencies. Weight: 3-8. Every term. *Fowler, Llewellyn, Rockwell, and Giragos*

PSC-245(C). *Psychosomatic Medicine and Liaison Psychiatry*. Consultations are carried out on inpatients and other services. Treatment may be offered as recommended. Small group patient care conferences are held with specialized groups in the hospital. This may be taken in conjunction with courses PSC-289(B) and 301(B). Weight: 3-8. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Reckless, Breslin, Short, and Staff*

PSC-251(C). *Community Psychiatry and Mental Health*. The student will accompany physicians and others in the mental health field to community centers and will meet with various agency groups. They will be assigned a lab project in an area of community study. Weight: 4-8. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Llewellyn, Eisdorfer, Maddox, Rockwell, Giragos, Fowler, Altrocchi, and Lowenbach*

PSC-253(C). *Group Psychotherapy and Psychodrama*. Observation of a private practice group psychiatry on-going group of patients with mixed psychopathological states. Post session discussions follow each group meeting. Weight: 3. Term 2: Nov.-Jan. *Reckless and Staff*

PSC-255(C). *Marriage Counseling in Medical Practice*. The principles

and practices of marriage counseling will be taught. Required reading assignments will be made. The non-medical resources of marriage counseling will also be presented. Sexual problems commonly occurring in marriage will be discussed. Weight: 1. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Llewellyn, Breslin, and Pfeiffer*

PSC-259(C). *Clinical Neurophysiology (EEG)*. Didactic and tutorial training in clinical neurophysiology as it relates to diseases of the central nervous system. The technical and interpretative aspects of electroencephalography are taught. Weight: 3. Every term. *Wilson*

PSC-261(C). *Practice of Psychological Assessment Techniques*. Demonstrations and practice in the administration and in interpretation of psychological assessment techniques with emphasis on the potential utility of these techniques to physicians. Weight: 1. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Huse and Staff*

PSC-267(C). *Clinical Child Psychiatry*. Survey of child and adolescent psychopathology including diagnostic treatment and consultative approaches. Conferences and seminars augment closely supervised clinical experiences. Weight: 3-6. Terms 1, 2, 3, or 4 or Terms 1 and 2 or 3 and 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May; Sept.-Jan., Jan.-May. *W. Anderson*

PSC-315(C). *Pathology of Perception and Thinking*. The clinical disorders of perception and thinking will be presented. The neurological, psychiatric, psychological, and psychophysiological examinations that best elicit these disorders will be demonstrated. Concepts from neurology, psychiatry, and psychology will be compared and integrated. Weight: 2. Term 3: Jan.-March. *Ellinwood and Thompson*

PSC-317(C). *Forensic Psychiatry*. Seminar course covering areas of overlap between psychiatry and law. Criminal responsibility, mental competency, commitment procedures, testamentary capacity, family law, expert witness procedures, and legislative and theoretical issues. Weight: 1. Term 1: Sept.-Nov. *Pfeiffer*

PSC-327(C). *Lectures in Clinical Psychopharmacology*. The animal behavioral, human experimental, neurophysiological, and biochemical mechanisms of action and the clinical use of psychoactive drugs. This course will cover the ataratic, hypnotic, stimulant, antidepressant, and hallucinogenic groups of drugs. Weight: 1. Terms 1 and 2: Sept.-Nov., Nov.-Jan. *Mayfield, Ellinwood, Short, Wilson, and Reilly*

PSC-331(C). *Dynamic Approach to Medical Problems Based on Psychoanalytic Theory*. This course will be structured that the tenets and ideas of psychoanalytic psychology will be applied to the ancillary part of the total part of the management of patients on medical and surgical wards (a certain kind of psychosomatic approach). Weight: 2-4. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March March-May. *Bressler*

PSC-333(C). *Psychiatric Theory and Practice and Therapeutic Com-*

munity in a *Private Psychiatric Hospital*. Principles and practice of psychiatric diagnosis and treatment. Instruction in psychiatric interviewing techniques. Psychological testing theory and administration. Theory of and supervised experience in individual psychotherapy, group psychotherapy, psychodrama, occupational therapy, recreational therapy and total management of the patient. Board and lodging for single and married students furnished. Weight: 9. Every term. *Neville, Workman, Mallory, and Johnson*

PSC-335(C). *Research Preceptorship in Clinical Psychiatry*. This course allows the student to work on a research project in clinical psychiatry with selected members of the psychiatric staff. Weight: 3-8. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Clinical Staff by arrangement*

PSC-337(C). *Geriatric Psychiatry*. The medical and clinical aspects of geriatric psychiatry with emphasis on diagnosis and management of geriatric patients in a variety of treatment facilities. Course includes attendance at scheduled conferences and supervised review of geriatric literature. Course may be taken in conjunction with PSC-214(B). Personality Development II-Adolescence and Old Age. Weight: 3-8. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Busse, Peak, Verwordt, Wang, Palmore, and Staff*

PSC-339(C). *Preceptorships in Clinical Psychiatry*. An advanced training program in the preceptorship style for the recognition, diagnosis, prognosis and treatment of psychiatric disorders. Experience will be mainly with in-patients and patients seen in consultation from other services but may include out-patients as well. Weight: 3-8. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Clinical Staff by arrangement*

PSC-343(C). *Theoretical and Practical Aspects of Alcohol and Drug Abuse*. The personality and sociocultural aspects of the drug and alcohol abuser are considered in depth. A student is taught the neuropharmacology of drug and alcohol abuse and is instructed in laboratory and research techniques with this population. He is offered a chance to engage in treatment of the abuses. Weight: 6-8. Terms 3 and 4: Jan.-March, March-May. *Ellinwood, Mayfield, and Maddox*

PSC-345(C). *Public Hospital Psychiatry*. The student is given administrative and professional responsibility for one ward at the Cherry State Hospital in Goldsboro, N. C. Experience may be obtained using the complete spectrum of psychiatric treatments, as well as the opportunity to learn the administrative network of a large state hospital. Supervision is offered at the hospital by experienced state psychiatrists supplemented by psychiatric consultants from Duke. Board and lodging furnished. Weight: 9. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *James and Reckless*

PSC-347(C). *Public Hospital Psychiatry*. The student has the op-

portunity to visit one of the specialized units at the Cherry Hospital with one of the Duke consultants. The units available depend on the needs of the hospital and may include one of the following units: alcoholism, adolescent and acute treatment. Weight: 4. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *James and Reckless*

PSC-349(C). *Clinical Preceptorship in Phenomenological Psychiatry*. This preceptorship is offered in association with PSC-297(B) Biochemistry of Behavior. The student will make clinical rounds in various areas of the hospital and the emphasis will be to demonstrate clinical examples emphasizing theoretical material in the third year course. Weight: 4-6. Term 3: Jan.-March. *Short*

PSC-351(C). *Clinical Use of Computers in Psychiatry*. The course will refamiliarize with Fortran, the use of the IBM 1130, the use of the IBM Conversational Programming System and the Psychiatric Information Network. Weight: 8. Terms 2 and 3: Nov.-Jan., Jan.-March. *Gianturco and Ramm*

PSC-353(C). *Prison Psychiatry—Adult and Adolescent*. The student will work full-time in a prison setting, treating adults and adolescent offenders, both with psychiatric illness and behavioral disturbances. Supervision will be provided by Duke and UNC consultants and the Central Prison mental health staff. Opportunities for conferences and participation in behavioral research are readily available. Weight: 9. Terms 1, 2, 3, or 4: Summer term, Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Gallemore, Britt, and Smith*

PSC-355(C). *Clinical Experience in Psychotherapy*. A student who undertakes the psychotherapy of a psychiatric patient may obtain credit for this experience provided he can obtain the services of a psychiatric faculty member to serve as supervisor for this experience. The arrangement should be confirmed with the fourth year clinical D.O.M.S. Weight: 1-3. Every term. *Psychiatric Staff*

PSC-357(C). *Behavior Therapy Seminar*. This experience is offered as a continuum throughout the whole academic year. It will consist of a review of pertinent literature, a discussion of cases currently under treatment by members of the psychiatric department as well as organized reading. Supervision will be offered in a case undertaken by the trainee. This course may be only taken in its entirety from the period September through May of the academic year. It may be taken in conjunction with PSC-293(B). Weight: 1-2. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Feather and Rhoads*

Radiology

Professor R. Lester, *Chairman*; Administrator S. Paine; Radiodiagnosis Division: Associate Professor P. Capp, *Director*; Professor G. Baylin;

Associate Professors W. Barry, J. Goree, T. Harle, I. Johnsrude, R. Rice; Assistant Professors J. Chen, J. Gehweiler, J. Jimenez; Associates J. Buchanan, T. Hetherington, M. Jarmakani, D. Knudson, E. McCormick, J. Sexton, J. Smith, T. Thompson; T. Vaughan; Instructor J. Carranza; Radiation Therapy Division: Professor P. Cavanaugh, Director; Professor J. Evans; Associate Professor B. Worde, Assistant Professor H. Connell, Research Associate, Raymond U; Nuclear Medicine Division: Associate Professor J. Goodrich, Director; Assistant Professor, R. Gorten, C. Harris, R. Wilkinson; Associate, Raleigh Johnson; Instructor H. Barnett; Radiobiology Division: Associate Professor A. Sanders, Director; Assistant Professor W. Currie; Associate G. Hill; Radiation Physics Division: Assistant Professor A. McCrea; Radiation Technology: Assistant Professor J. Cahoon, Chief Technician, J. Miller; Clinical Staff: Associate Clinical Professor O. Doyle; Assistant Clinical Associates G. Gray, J. Sherrill, G. Schlaseman, T. Thurston, J. Wear; Radiation Safety: Associate C. Knight Residents N. Abramson, J. D. Atchison, W. Bender, W. Bland, M. Block, K. Chow, J. Coan, R. Dorsey, R. Falls, B. Gerber, R. Gifford, R. Goebel, D. Grode, L. Grundy, J. B. Haslam, A. Kasdan, S. Martinez, L. Maz-zocchi, G. McCord, T. Moore, R. Older, J. Poklepovic, R. Seningen, L. Southworth, S. Stroup, R. Thompson, J. Tyson, T. Vance, J. Wall, G. Wardwell

Elective Courses

RAD-207(C). *Pediatric Radiology*. A specialized program of instruction and participation in the wide variety of radiographic examinations in the pediatric age group. Special correlation of these examinations to the problems of specific diagnosis and patient care will be made. Weight: 4. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Capp, Lester, and Chen*

RAD-209(C). *Clerkship in Neuroradiology*. A specialized program of detailed instruction in neuroradiology. The program includes participation in the performance and interpretation of a variety of examinations including carotid arteriography, retrograde brachial arteriography, pneumoencephalography, myelography, and others. Weight: 4. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Goree, Jimenez, and Staff*

RAD-213(C). *Gastrointestinal Radiology*. This clerkship is designed to provide a comprehensive course in gastrointestinal radiology. It will provide opportunity to observe and perform examinations, and will include emphasis on surgical pathologic correlation with the radiographic findings. Weight: 4. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Rice*

RAD-215(C). *Clinical Radiation Therapy*. Approximately two-thirds of new cancer patients seen at the medical center are concentrated with-

in the Division of Radiation Therapy. The course mainly provides an opportunity to observe a wide spectrum of clinical behavior in new patients, follow-up clinic, and in cases undergoing treatment. The course is aimed particularly at students leaning toward gynecology and otolaryngology as well as general surgery. Weight: 4-8. Every term. *Cavanaugh, Worde, Evans, Connell, and McCrea*

RAD-229(C). *Basic Radiology Clerkship*. This clerkship provides a full or part time exposure to general radiology, including radiation therapy. Students are given preferences in selection of subspecialty assignments but emphasis is on a broad view of the specialty of radiology. Part time courses can be arranged to fit other schedules. Weight: 4-8. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Lester and Staff*

RAD-223(B). *Radioisotope Methods and Techniques in Biomedical Research*. Introduction to principles and practices in biomedical research applications of radioactive materials: fundamentals of radiosensitivity, nuclear instrumentation, counting methodology, statistics of counting, liquid scintillation counting, external standard ratio, sample preparation. Weight: 3. Term 1: Sept.-Nov. *Sanders and Currie*

RAD-225(B). *Methods and Techniques of Radiobiology-Subcellular*. To acquaint student with current research, techniques, and methodology in cell and subcellular radiobiology. Weight: 8. Terms 1, 2, 3, and 4: Sept.-Nov., Nov.-Jan., Jan.-March, April-May. *Sanders, Currie, Hill, and Evans*

RAD-227(B). *General Radiobiology*. Basic fundamentals essential to an understanding biological effects of ionizing radiation. Major sections include radiation physics, radiation dosimetry, target theory and activated water theory in radiation damage, oxygen effect, radiobiochemistry, subcellular effects, tissue radiosensitivity, general radiation syndrome. Weight: 2. Term 3: Jan.-March. *Sanders, Currie, Hill, and Evans*

SUR-230(C). *Seminar in Urologic Diseases and Techniques*. Lecture-seminar course by members of the staff in urology and radiology, providing an introduction to the spectrum of urologic diseases, amplified by demonstration of urologic and radiologic diagnostic methodology. Clinical problems to be stressed include endocrinopathies, pediatric urology, obstructive uropathies, renovascular hypertension, urinary calculi, and urologic malignancies. Informal seminars given weekly. Weight: 2. Every term. *Glenn, Dees, Boyarsky, Anderson, Malin, Barry, and Staff*

SUR-291(C). *Cancer: CHS, MED, MIC, OBG, PED, PTH, RAD, and SUR aspects*. Taught by an interdepartmental faculty, course consists of seminars in clinical and related basic aspects of oncology (6 hour week); case presentation conferences (2 hour week); and ward and clinic experiences in diagnosis and treatment (remaining time). The student elects

one clinical department for the ward and clinic experiences. Weight: 2-8. Terms 1 and 3; Sept.-Nov., Jan.-March. *Shingleton, Cavanaugh, Heyden, Johnston, Joklik, Laszlo, and Porter*

Surgery

Professor D. Sabiston, *Chairman; Division Chiefs:* (Urologic Surgery) Professor J. Glenn; (Orthopaedic Surgery) Professor J. Leonard Goldner; (Otolaryngology) Professor W. Hudson; (Neurosurgery) Professor G. Odom; (Plastic and Maxillofacial Surgery) Professor K. Pickrell; (Thoracic Surgery) Professor W. Sealy; (General Surgery) Professor W. Shingleton; (Dentistry) N. Ross.

Professors D. Amos, W. Anlyan, L. Baker, J. Beard, S. Boyarsky, F. Clipping, E. Day, J. Dees, N. Georgiade, K. Grimson, W. Peete, R. Postlethwait, G. Quinn, J. Semans, B. Woodhall, W. Young; Professors Emeritus El Alyea, E. Eagle, C. Gardner, D. Hart; Associate Professors E. Anderson, F. Bassett, R. Bonar, E. Clifford, M. Dillon, P. Ebert, R. Gregg, B. Hills, D. McCollum, B. Nashold, D. Silver, W. Smith, D. Stickel; Associate Clinical Professors J. Davis, W. Hollister, T. Takaro; Assistant Professors R. Chen, T. Cole, A. Collins, P. Kenan, N. Kirshner, P. Labay, M. Mahaley, J. Malin, R. Massengill, F. Mauney, S. Patterson, H. Seigler, L. Thompson, J. Urbaniak, F. Ward, R. Wilkins; Assistant Clinical Professors E. Bugg, R. Coonrad, G. Ferguson, J. Glasson, L. Mason, C. Patterson, L. Roberts, M. Schiebel, S. Scott; Associates D. Beard, B. King, B. Sapp, R. Snider; Clinical Associates S. Kapoor, J. Kouns, T. Pope, N. Schupper, E. Staub; Research Associates R. Georgiade, L. Gottsch, R. Ishizaki, A. Langlois, L. Sverak, A. Thiele, L. Veprek

Clinical Lecturers D. Boyer, G. King, L. Meyer, G. Miller, O. Miller, R. Musgrave, W. Roberts, F. Stelling; *Instructors* R. Cline, M. Condon, J. Dobson, J. Farmer, M. Frankel, W. Gay, J. Grimes, C. Hearn, J. Hogan, R. Kusiak, R. Mathews, J. Porter, J. Royer, D. Slaughter, H. Stone, R. Taniguchi, N. Teague, S. Wells, L. West; *Clinical Instructors* G. Carver, J. Coppridge, C. Dart, H. Deaton, S. Hobart, J. Hughes, W. Inabnet, G. Lazenby; *Fellows* J. Eaton, H. Iwahashi, Y. Kaku, P. Panijayanond, D. Paulson, E. Sanford, L. Simpson, J. Sinha, V. Thakur; *Interns* G. Brannen, B. Coffey, C. Davis, D. Fareed, R. Ferguson, A. Gervin, J. Grant, F. Gray, E. Hoover, B. Horten, K. Jones, P. Keats, C. Lanning, J. Lowe, R. Millar, L. Peterson, D. Pfohl, D. Samson

Required Courses

The required course in surgery (SUR-200) is given in Year 2 and consists of a seven-week term for each student. This constitutes the "core"

course in surgery and during this time the primary aim is the presentation of those *concepts* and *principles* which characterize the discipline of surgery. Emphasis is placed upon the basic and objective studies which form the foundation of surgical diagnosis and treatment. Stress is placed upon subjects which have their foundation in objective laboratory and clinical documentation. These topics are presented in informal seminar three times weekly and include antisepsis and surgical bacteriology, wounds and wound healing, inflammation, fluid and electrolyte balance, shock, the metabolic response to trauma, the biology of neoplastic disease, gastrointestinal physiology and its derangements, blood coagulation, thrombosis, and embolism.

The students are divided into small groups and each is assigned a senior surgical instructor. Rounds at the bedside are made three times weekly with the senior instructor. Each morning the students attend clinical rounds with the resident staff for discussion of practical surgical diagnosis and therapeutics. A one-hour session is devoted daily to a surgical specialty demonstration which includes conferences concerning anesthesia, neurosurgery, orthopaedics, otolaryngology, plastic surgery, and urology. Students are assigned patients on the surgical wards for diagnosis and management. *Sabiston and Surgical Staff*

A second required course, Emergency and Disaster Surgery (SUR-337), is given during the second year for one week. The course is designed to teach basic principles of emergency medicine, and its goal is to prepare the student to handle properly most medical and surgical emergencies. Included in the course are lectures and coordinated laboratory exercises which stress the pathophysiologic derangements that occur during the emergencies and which indicate the management of the derangements. *Silver and Bassett*

Elective Courses

SUR-201(C). *Advanced Surgery—Emphasis Cancer*. Advanced concepts in surgery will be presented in seminars and in ward, clinic, and operating room experiences. Fifty to 75 percent of the time will be devoted to clinical cancer and related basic topics, and the remainder to surgery generally. (*Note: seminars will be the same as in SUR-291. The student therefore may elect to take SUR-201 or 291 but not both.*) Weight: 2-8. Term 1: Sept.-Nov. *Shingleton and Staff*

SUR-202(C). *Advanced Surgery—Emphasis Cardiovascular-Thoracic*. Advanced concepts in surgery will be presented in seminars and in ward, clinic, and operating room experiences. Fifty to 75 percent of the time will be devoted to cardiovascular-thoracic surgery and related basic topics, and the remainder to surgery generally. Weight: 8; 2 for seminars only. Term 2: Nov.-Jan. *Sabiston, Dillon, Ebert, Grimson, Mauney, Oldham, Sealy, Silver, and Young*

SUR-203(C). *Advanced Surgery—Emphasis Transplantation*. Advanced concepts in surgery will be presented in seminars and in ward, clinics, and operating room experiences. Fifty to 75 percent of the time will be devoted to clinical transplantation and related basic topics, and the remainder to surgery generally. Weight: 8; 2 for seminars only. Term 3: Jan.-March. *Stickel, Seigler, Amos, and Staff*

SUR-204(C). *Advanced Surgery—Emphasis Gastrointestinal and Trauma*. Advanced concepts in surgery will be presented in seminars and in ward, clinic, and operating room experiences. Fifty to 75 percent of the time will be devoted to surgery of the alimentary tract and trauma and related basic topics, and the remainder to surgery generally. Weight: 8; 2 for seminars only. Term 4: March-May. *Peete, Grimson, Mauney, Postlethwait, and Shingleton*

SUR-205(C). *Advanced Surgery—Emphasis Pediatric Surgery*. Advanced concepts in surgery will be presented in seminars and in ward, pediatric surgical clinic, and operating room experiences. Fifty to 75 percent of the time will be devoted to pediatric surgery and related basic topics, and the remainder to surgery generally. Weight: 8; 2 for seminars only. Term summer: June-Aug. *Silver and Staff*

SUR-206(C). *Surgical Aspects of Thoracic Disorders*. The student will be assigned to the thoracic service where he will participate in the diagnosis, surgical treatment of patients with pulmonary, esophageal, and cardiac disorders. He will make rounds with the senior and house staff, attend conferences in the department, and meet at intervals with the senior staff concerning special problems in this field. Weight: 6. Every term. *Young and Sealy*

SUR-219(C). *Advanced General and Thoracic Surgery*. Special attention will be given to those subjects in surgery common to all medical practices. Patients will be assigned to the students. The major emphasis will be on physiologic and pathologic changes, diagnosis, and the indications for operation. Weight: 8. Every term. *Mauney, Silver, Dillon, Seigler, Stickel, and Postlethwait*

SUR-221(C). *Surgical Specialties and Ophthalmology*. The student will attend selected conferences of all the surgical specialties and ophthalmology. Additionally he will select two or three of these specialties in which to concentrate experience (on one service at a time) in the operating rooms, clinics, and wards of the V.A. Hospital. Pathophysiology, diagnosis, and treatment will be emphasized. Weight: 8. Every term. *Silver, Chandler, Cole, Malin, Thompson, Urbanic, and Wilkins*

SUR-223(C). *Medical and Surgical Renal Disease*. Experience is offered in diagnosis and management of surgical diseases of the urinary tract and medical renal diseases with emphasis on clinical patient care. Participation in special urologic clinics and exposure to hemodialysis is offered with emphasis upon renal transplantation, renal failure, renovas-

cular hypertension, and other aspects of medical and surgical disease. Weight: 8. Every term. *Glenn, Robinson, and Respective Staffs*

SUR-225(C). *Urological Rehabilitation and Laboratory Investigation*. Clinical experience is offered in urologic and rehabilitation aspects of quadriplegia, paraplegia, and the neurogenic bladder. Clinical and laboratory investigation of urodynamics will include experimental animal surgery, smooth muscle physiology, neuromuscular pharmacology, and specialize urodynamic techniques. It may be subscribed as a major or minor elective. Weight: 8 or 2. Every term. *Boyarsky, Malin, Labay, Gregg, Glenn, Barry, and Staff*

SUR-227(C). *Clinical Urologic Surgery*. The diagnosis, management, and surgical treatment of patients with urologic disorders will be stressed. Students will be afforded intimate association with the entire staff in the clinics, wards, and operating rooms and will participate in surgery. Cystoscopic and urographic diagnostic methods along with other techniques will be taught. Weight: 8. Every term. *Glenn, Dees, Boyarsky, Anderson, Malin, and Staff*

SUR-230(C). *Seminar in Urologic Diseases and Techniques*. Lecture-seminar course by members of the staff in urology and radiology, providing an introduction to the spectrum of urologic diseases, amplified by demonstration of urologic and radiologic diagnostic methodology. Clinical problems to be stressed include endocrinopathies, pediatric urology, obstructive uropathies, renovascular hypertension, urinary calculi, and urologic malignancies. Informal seminars given weekly. Weight: 2. Every term. *Glenn, Dees, Boyarsky, Anderson, Malin, Barry, and Staff*

SUR-233(C). *Basic Neurosurgery Course*. Disease conditions commonly encountered in neurosurgery are presented. Clinical presentation of a common neurological disorder such as a brain tumor or head injury is made by a member of the staff. Clinical features and plan of diagnostic investigation are stressed. The clinical disorder is used as a focal point from which to carry the presentation into the basic science area related to the clinical problem. Weight: 1. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Mahaley, Nashold, and Wilkins*

SUR-235(C). *Clinical Neurosurgery*. Course is designed for those students with future interest in the neurological sciences. Duties include the workup and care of inpatients, workup of clinic patients, assistants in the operating room, routine postoperative care, daily rounds, and night call. Weekly conferences are held in neurology, neuropathology, and neuroradiology, neurophysiology, and anatomy and in special lectures. Weight: 8. Every term. *Odom, Nashold, Mahaley, and Wilkins*

SUR-237(C). *Investigative Neurosurgery*. The student is assigned a project relating to the neurological sciences and is provided with technical help, recording equipment, and experimental animals necessary for

its completion. Each student plans and executes his own individual project, with the help of the neurosurgery staff. Weekly conferences are also attended. Weight: 8. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Odom, Nashold, Mahaley, and Wilkins*

SUR-239(C). *Clinical Otolaryngology*. This course will provide the student with a comprehensive survey of clinical otolaryngology. Duties will include participation in both outpatient clinic activities and inpatient care in addition to assisting to the operating room. The student will participate in ward rounds and in the various conferences held by the division. Weight: 6. Every term. *Hudson, Kenan, and Cole*

SUR-240(C). *Otolaryngologic Seminar*. This conference and demonstration course will provide an introduction to a variety of clinical problems in otolaryngology. Lectures will be supplemented with case presentations illustrating problems encountered in this field. Weight: 1. Every term. *Hudson, Kenan, and Cole*

SUR-241(C). *Medical Audiology and Speech Pathology*. Students will be working in the Hearing and Speech Clinic. Special attention will be given to advanced audiometric techniques including instruction in the use of the Bekesey and PGSR audiometry. Emphasis will also be placed upon vestibular mechanisms and testing. The student will also spend some time with the speech pathologist observing methods diagnosis and management of the various speech problems. Contact with clinical otolaryngology will be maintained. Weight: 5. Every term. *Mr. King and Dr. Massengill*

SUR-245(C). *Reconstructive Plastic Surgery*. Study of broad principles of trauma, wounding, healing, and varied reparative processes. Weight: 6. Every term. *Pickrell, Georgiade, and Staff*

SUR-248(C). *Investigative and Clinical Approach to Wound Healing, Including Tissue Preservation and Microbiology of Burns*. Purpose of this course is to orient students both in the laboratory and on a clinical basis of the various investigative possibilities giving him the opportunity to work in the plastic surgery research laboratories and correlate the clinical aspects. Weight: 6. Every term. *Georgiade, Pickrell, and Staff*

SUR-250(C). *Clinical Acute Respiratory Physiology*. Work in Anesthesiology Blood Gas Laboratory learning theory and practice of oxygen electrode, carbon dioxide electrode and pH meter and ancillary techniques, and in recovery room, Respiratory Care Unit, and study of ventilator problems. Weight: 2. Every term. *Hall, Vartanian, Mr. Anderson, and Thompson*

SUR-252(C). *Clinical Anesthesiology II*. Introduction to theory and practice of clinical surgical anesthesia, diagnostic and therapeutic nerve blocks, and cardiopulmonary resuscitation. Students will review physiology and pharmacology of anesthesia and perform general and regional anesthesia and will assist in post anesthetic respiratory care. Weight: 8. Every term. *Dent, Hall, Vartanian, Breen, Talton, and Sheikholislam*

SUR-253(C). *Anesthesiology Research*. Course teaches techniques utilized in clinical and laboratory research in anesthesiology. In collaboration with the faculty, the student will work on a research project related to the physiology and pharmacology of anesthetic practice. A wide range of facilities is available for the measurement of respiratory and circulatory parameters, both in animals and in man. Weight: 8. Every term. *Hall*

SUR-254(C). *Speech and Hearing Problems in Children with Clefts of the Lip and Palate*. Students will have abundant opportunity to learn and work in the Speech and Hearing Laboratory and in the Child Guidance Clinic with children with speech defects. Methods of evaluation, testing and remedial measures will be studied thoroughly. Weight: 5. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, April-May. *Massengill, Pickrell, Hudson, and Staff*

SUR-255(C). *Medical Speech Pathology*. Diagnostic and rehabilitation treatment used with the patients at the Duke Medical Center, including articulation disorders, delayed speech development, cleft palate, stuttering, voice disorders, aphasia, cerebral palsy, language disorders, mental retarded speech, lisping, oral inaccuracy, laryngectomy, and other disorders of speech not falling under one certain category. Weight: 1. Every term. *Massengill*

SUR-257(C). *Medical Speech Pathology Applied to Reconstructive Plastic Surgery*. Research techniques used by speech pathologist with reconstructive plastic surgery patients having organic speech problems. Emphasis placed upon cinefluorographic investigation and speech results achieved by different surgical procedures. Different speech appliances also reviewed. Organization of speech pathology research programs co-ordinated with reconstructive surgery departments. Weight: 1. Every term. *Massengill*

SUR-259(C). *General Principles of Orthopaedics*. A full or part-time experience on the orthopaedic service with duties and responsibilities similar to a junior intern. Inpatient care, outpatient examination, and operating room experience are included. Individual or group discussions each day with attending staff. The purpose of the course is to present broad concepts of orthopaedics to students planning general practice, pediatrics, allied surgical specialties, or orthopaedics. Weight: 8. Every term. *Goldner, Baker, Clippinger, McCollum, Bassett, and Staff*

SUR-261(C). *Office and Ambulatory Orthopaedics*. Introduction to management of patients with complaints referable to the musculoskeletal system. Emphasis on methods of examination and X-ray interpretation. Orientation in record keeping, use of punch cards for diagnosis, office management and similar details. Weight: 8. Every term. Students may select individual instructor. *Goldner, and all senior staff at Duke, Watts, and Durham V.A. orthopaedic services*

SUR-263(C). *Orthopaedics in the Community Hospital*. Office and

hospital practice are emphasized with participant experiences in coordination of private practice, clinic practice, emergency room and consultation services. The course is conducted in the offices of the Associate Orthopaedists in Durham and in the Community Hospital. Weight: 8. Every term. *Bugg, Glasson, Coonrad, Kapoor, and Staff*

SUR-265(C). *Cerebral Palsy and Other Musculoskeletal Abnormalities*. The material for this course is available at the North Carolina Cerebral Palsy Hospital and Duke University Medical Center. Students participate in the daily program of diagnosis, treatment, and rehabilitation techniques of the patient with neurological deficits. This includes all aspects of management with experiences in the clinics and in the operating room. Weight: 8. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Goldner and Staff of Orthopaedic Service, Duke and North Carolina Cerebral Palsy Hospital*

SUR-267(C). *Clinical Conference in Cerebral Palsy*. Conferences are arranged for those interested in neurological diseases, pediatrics, and related fields. These conferences demonstrate both the individual and group approach to the patient with complex neurologic condition as it affects both growth and development. Outpatients and inpatients are utilized for subject material. Staff personnel readily available for individual seminars. Weight: 4. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Baker, Goldner, Bassett, and North Carolina Cerebral Palsy Hospital Staff*

SUR-269(C). *Upper Extremity Surgery and Reconstruction*. A general or specific study of conditions affecting the entire upper extremity. The hand may be studied as evidence of systemic disease or from the viewpoint of hand deformities after trauma, congenital defects, or the changes resulting from arthritis. Weight: 8. Every term. *Goldner, Clippinger, McCollum, Bassett, and Staff*

SUR-271(C). *Arthritis—Spine and Extremities*. Clinical and operating room experience in the management of adult and children's rheumatology. Program coordinated with the Department of Medicine. Rounds, conferences, and clinics are attended at scheduled times. The student has responsibilities of outpatient and inpatient care. Laboratory investigation available if desired. Weight: 8. Every term. *McCollum, Goldner, and Medical Rheumatology Staff*

SUR-273(C). *Athletic Medicine—Physical Conditioning and Management of Injuries*. The course is directed toward preparing physicians for participating in the athletic aspects of a community school program. The student will learn the general principles of management of trauma, function of the musculoskeletal system, physical conditioning, protective equipment, and the care of the athlete. Experience is available with the Duke athletic teams as well as those of the local high schools. Weight: 8. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Baker, Clippinger, Bassett, and Orthopaedic Staff*

SUR-275(C). *Electromyography*. This course is an introduction to the theory, techniques and practice of clinical electromyography. Conferences and demonstrations are the principle methods of instruction. The student participates in all phases of diagnostic study and learns the indications for use of electromyography as well as the interpretation of data. Weight: 2. Every term. *Clippinger, Urbaniak, and Orthopaedic Staff*

SUR-277(C). *Orthopaedic Research*. Individual projects are assigned for completion during a limited period of time. A student works with an investigator in the Orthopaedic Laboratory either at Duke Medical Center or the Durham Veterans Administration Hospital. Clinical investigative studies are also available at both institutions. Weight: 8. Every term. *Goldner, Orthopaedic Senior Staff, and House Staff*

SUR-279(C). *Orthopaedic Amputee Program—Clinics, Surgery, and Prosthetics*. The basic principles of amputation problems are presented in preoperative indications, principles of surgery and postoperative inpatient and outpatient care. The multiple problems are presented through weekly amputee clinics. The principles of amputee prosthetics are taught in the Prosthetic and Orthopaedic Appliances Department. The student follows a particular patient through the entire program from amputation to vocational placement. Weight: 4. Every term. *Goldner, Clippinger, Mr. Titus, Mrs. Horton, Other Members of the Physical Therapy Staff, and the Duke Prosthetics and Orthopaedic Appliances Department*

SUR-281(C). *Introduction to Fractures and Musculoskeletal Trauma*. Students will participate in the emergency management of patients through the Duke emergency room primarily, but also through Watts, Lincoln, and the Durham VA Hospitals. Principles of fractures in trauma will be given throughout the week at specified times and attendance at fracture clinic will be required. Weight: 3. Every term. *Entire Senior Staff at Duke and Watts, supervision by Dr. Goldner at Duke, Dr. McCollum at V.A., and Dr. Bugg at Watts*

SUR-283(C). *Orthopaedics of Infants, Children, and Adolescents*. Orientation of students interested in pediatrics or orthopaedics with emphasis on the basic problems associated with congenital abnormalities and other syndromes of the musculoskeletal system in these age groups. Experience with patients extending from infancy to adolescence is available. The depth of teaching and experience can extend from a few hours a week observation to a full externship. Weight: 8. Every term. *Goldner, Baker, Clippinger, McCollum, Bassett, Stelling, Meyer, Miller, Bugg, Coonrad, Glasson, Kapoor, Lincoln, and Musgrave*

SUR-289(C). *Rehabilitation Medicine*. Utilization of rehabilitation techniques as applied to chronic patient care. Work with paramedical personnel in the overall therapy and discharge planning of severely disabled patients and become familiar with public and private resources. Course is flexible and can be tailored for specific need and requirement

of student. Weight: 1-6. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Gregg and Staff*

SUR-291(C). *Cancer: CHS, MED, MIC, OBG, PED, PTH, RAD, and SUR aspects*. Taught by an interdepartmental faculty, course consists of seminars in clinical and related basic aspects of oncology (6 hour week); case presentation conferences (2 hour week); and ward and clinic experiences in diagnosis and treatment (remaining time). The student elects one clinical department for the ward and clinic experiences. Weight: 2-8. Terms 1 and 3: Sept.-Nov., Jan.-March. *Shingleton, Cavanaugh, Heyden, Johnston, Joklik, Laszlo, and Porter*

*ANA-206(B). *Anatomy of Back and Extremities*. Complete dissection of back and extremities, including pectoral and pelvic girdles. Visual aids will be used extensively. Course planned for orthopaedics, general practice, or neurosurgery. Weight: 3. Term 3: Jan.-March. *Markee and Bassett*

*ANA-208(B). *Anatomy of the Trunk*. Emphasis will be on the anatomy of the thoracic, abdominal and pelvic organs, and their blood supply, innervations and relationships. The dissections will be augmented by use of prosections, motion pictures, and prerecorded TV presentations. Course planned for general practitioners, specialists in surgery and internal medicine. Weight: 2. Term 3: Jan.-March. *Markee and Duke*

*ANA-216(B). *Anatomy of the Head*. Course deals with: (a) the interior of the cranium and the ear, eye, and orbital contents; (b) deeper structures of the head, including the brain and its blood supply; and (c) the nasal and orbital cavities, the pharynx, and paranasal sinuses. This course is planned for general practitioners, neurosurgeons, clinical neurologists, ophthalmologists, and otolaryngologists. Visual aids will be used extensively. Weight: 2. Term 4: April-May. *Markee and Everett*

ANA-256(B). *Surgical Neuroanatomy*. This course will utilize gross brain and spinal cord specimens, the skull, angiograms, X-rays, pneumoencephalograms, and myelograms to correlate neurosurgical diseases and procedures with regional nuclei and tracts of the nervous system. Weight: 1. Terms 1, 2, 3, and 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Mahaley*

PSC-331(C). *Dynamic Approach to Medical Problems Based on Psychoanalytic Theory*. This course will be structured that the tenets and ideas of psychoanalytic psychology will be applied to the ancillary part of the total part of the management of patients on medical and surgical wards (a certain kind of psychosomatic approach). Weight: 2-4. Terms 1, 2, 3, or 4: Sept.-Nov., Nov.-Jan., Jan.-March, March-May. *Bressler*

Health Related Professions

Cytotechnology

Assistant Professor W. Johnston, *Director*; Assistant Professor M. Vazquez, *Assistant Director*; Associate J. Amatulli, Teaching Supervisor and Staff of Department of Pathology as required in special phases of instruction.

The School of Cytotechnology at the Department of Pathology offers a twelve-month course in technical and diagnostic aspects of exfoliative cytology to qualified individuals. The minimum qualifications are twelve semester hours of biology, which may include anatomy, histology, zoology, botany, and physiology, and at least two years of college. The common practice is to admit individuals with B.S. or A.B. degrees and only in exceptional cases applicants with incomplete college requirements will be considered.

The program consists of two parts. Part I—six months, primarily theoretical and practical exercise in the techniques of exfoliative cytology and interpretation of the clinical material. Part II—six months practical training in all aspects of exfoliative cytology in participating in the routine work of the laboratory. One class is accepted annually on September 15. Graduates of this course are awarded a certificate and are eligible to take the certifying examinations given by the Registry of Medical Technologists of the American Society of Clinical Pathologists. There is no tuition

fee. Additional information about the School of Cytotechnology and applications for admission may be obtained from William Johnston, M.D., Department of Pathology, Duke University Medical Center, Durham, North Carolina 27706.

Dietetics

H. M. McLachlan, *Acting Director*; Administrative Dietitians N. Curtis, B. Hannah and B. Sowter; Research Dietitians B. Marshall and G. Howard; Clinic Dietitian C. Wason; Therapeutic Dietitians P. Barber, J. Black, C. Fluke, R. Fox Lowe, S. Pitz, A. Sites, E. Waller, L. Williams

A Dietetic Internship Program is offered to men and women who have earned a bachelor's degree in food and nutrition or institutional administration and meet the course requirements of the American Dietetic Association. The twelve months of post baccalaureate work consists of classroom instruction and clinical experience in administration, therapeutics, research, and education. After the successful completion of the Dietetic Internship, certificates and membership in the American Dietetic Association are awarded. For further information write: Department of Dietetics, Duke University Medical Center, Durham, North Carolina 27706.

Hospital Administration

Professor C. Frenzel, *Director*; Assistant Professor D. S. Smith, *Coordinator*; Professor L. Clark; Associate Professor L. Swanson; *Instructor* K. Schoonhagen

Clinical Lecturers E. C. Bryson; M. Pickens; J. Felts, G. Harris, B. McCall, C. Cobb, E. McCauley; *Clinical Preceptors* W. Andrews, J. Barnes, H. Bettis, R. Holmes, T. Howerton, J. Moulton, J. Pyne, M. Yount

Graduate education for hospital administration is offered through a 24-month program conducted jointly by the Graduate School and the Medical Center. The Program consists of selected graduate courses in business administration, political science, sociology, and hospital administration, and of a twelve-month administrative residency in hospitals and other health agencies. The Master of Hospital Administration degree is awarded to those who successfully complete the program.

Detailed information may be obtained from: Graduate Program in Hospital Administration, Box 3018, Duke University Medical Center, Durham, North Carolina 27706.

Medical Technology

Professor T. Kinney, *Director*; Associate Professors A. W. Musser, Associate Director; S. Osterhout, H. Silberman, C. Zmijewski; Assistant Professors R. Blaker, W. Kremer, B. Schlein, G. Spooner; Associate R. Habig; Teaching Supervisor and Registrar M. Britt; Assistant Registrar and Instructor L. Garriss; Instructors E. Bumgamer, A. Proctor; Clinical Instructors J. Carr, A. Finch, C. Harrison, N. Lester, M. Marshall, P. Pickett, A. Walker, W. Wilkerson, I. Wyatt

The School of Medical Technology offers a twelve-month internship program of instruction and rotation through the clinical laboratories of the Duke University Medical Center and the Veterans Administration Hospital.

The internship program is open to men and women who have either a baccalaureate degree or a minimum of three years of college (in an accredited college or university) with plans for receiving such a degree from the preparatory college upon completion of the internship program. Applicants must have successfully completed at least 90 semester (135 quarters) hours which include:

Chemistry—minimum of 16 semester hours (24 quarter hours) which includes one full year of general college chemistry. The remaining courses may be selected from qualitative, quantitative, organic, physical, or biochemistry. (One semester of quantitative analysis is strongly recommended.) All courses must include lectures and laboratories.

Biological Sciences—minimum of 16 semester hours (24 quarter hours). All required biological sciences must include lecture and laboratories. Courses may be selected from general biology, zoology, botany, physiology, comparative anatomy, parasitology, histology, histologic technique, genetics, or bacteriology. (Bacteriology is strongly recommended.)

Mathematics—minimum of 3 semester hours.

Courses in physics are recommended but not required. Electives may be selected from English, social sciences, arts, and humanities.

Courses taught during the Internship include clinical biochemistry, clinical microscopy, radioisotope theory, microbiology (bacteriology, mycology, virology), immunohematology, parasitology, introduction to clinical pathology, serologic techniques and histologic techniques. (Classes begin on July 1.)

Students are given a certificate upon completion of the Internship program and are qualified for examination and certification by the Registry of Medical Technologists of the American Society of Clinical Pathologists. They are eligible for membership in the American Society of Medical Technologists. This program is approved by the Council on Medical Education and Hospitals of the American Medical Association.

A \$25.00 non-refundable registration fee is required upon acceptance in the program. This is applied toward the \$50.00 breakage fee which is payable upon entrance. Students will be furnished rooms in dormitories and will receive a grant-in-aid of \$100 a month. Students are required to participate in the Hospital Insurance plan, furnish their own white uniforms, white shoes, and meals. Laundry of uniforms is furnished by the Medical Center. Students can expect to spend \$75 to \$100 for books during the year.

For further information and/or application blanks, write to: Registrar, School of Medical Technology, Department of Pathology, Duke University Medical Center, Durham, North Carolina 27706

Nuclear Medicine

Professor R. Lester, *Chairman of the Department of Radiology*; Associate Professor J. Goodrich, *Director of Nuclear Medicine Division*; Assistant Professors R. Gorten, C. Harris; R. Wilkinson, Jr., Assistant Professor Instructor H. Barnett; *Radiological Safety Officer* C. Knight

The School of Nuclear Medicine Technology offers a twelve-month program of instruction and clinical training in the Division of Nuclear Medicine, Department of Radiology. The program is divided into two parts: a three month intense didactic and laboratory preclinical course followed by a nine-month internship in the clinical aspects of Nuclear Medicine Technology. The nine-month internship is available only to those who successfully complete the preclinical course.

The three-month preclinical course covers such topics as nuclear physics and instrumentation, radiopharmacy, radiation safety and health physics, mathematics, and radiation biology. Classes meet five and one-half days per week and consist of lectures, classroom demonstrations, laboratory sessions, and seminars.

The nine-month internship consists of scheduled rotation through all areas of the clinical laboratory. Personal instruction and training are given in blood volume-red cell mass determinations, renograms, scanning, research techniques, thyroid function studies, placental localization, ultrasound technique, and many others. This period of training is also augmented with continued classroom and laboratory work.

Students who successfully complete the nine-month internship receive a certificate and are qualified for examination by nuclear medicine technology registries.

Applications will be accepted for consideration from the following:

1. Students who have earned two years or more of college credit toward a degree in any field of science.
2. Registered or registry-eligible medical technologists.

3. Registered or registry-eligible radiologic technologists.
4. Registered nurses.

All applications must be submitted by May 1. The admissions committee will review all applications at that time and notify all applicants by May 15, regarding their admission to the school.

A tuition fee of \$100.00 is required upon acceptance and is payable to the Division of Nuclear Medicine. If an applicant withdraws before August 1, this fee is refunded. After August 1, no refunds are made. The cost of books and supplies is approximately \$50.00. Laboratory coats and laundry service are furnished by the Medical Center.

Students who successfully complete the three-month preclinical course and enter the nine-month internship receive a monthly stipend of \$100.00.

For further information or application forms, write to Huey D. Barnett, Box 3166, Division of Nuclear Medicine, Duke University Medical Center, Durham, North Carolina 27706.

Nurse Anesthesia

Professor Sara J. Dent, *Chairman*, Department of Anesthesiology; Instructor M. Campbell, *Director of School of Anesthesia for Nurses*; M. Gardner, *Educational Program Director*; Assistant Nurse Anesthetists L. Glenn, F. Perry, A. Truitt, M. Haigler, A. Moody, F. Ivey, R. Lanier, J. Conway, G. O'Briant, N. Kapoor, S. Blake, S. Crowder, W. Prysock, M. Friedman, P. Palmer, J. Armstrong, J. Wrenn, B. Finch, J. Thomas

The twenty-four month course in anesthesia is available to well-qualified registered nurses. Instruction embraces the theoretical aspects and clinical application of all drugs and techniques in accepted usage.

The program is divided into quarters. The major part of the basic theoretical instruction is given during the first three quarters. After a pre-clinical period of eight weeks, clinical practice runs parallel with the theoretical program. One class is accepted annually and enrolled in January. All appointments of the current year are made by September 1 of the preceding year. Graduates of this course are eligible to take the qualifying examination for membership in the American Association of Nurse Anesthetists. Tuition is \$150.00. Additional information concerning nurse anesthesia may be obtained from Mary B. Campbell, C.R.N.A., P.O. Box 3094, Duke University Medical Center, Durham, North Carolina.

Physical Therapy

Professor M. Jacobs, *Chairman*; Professor H. Kaiser; Assistant Professor E. Villanueva; Associates J. Barr, E. Blumenthal, J. Cantey, R. Federchuck, G. Horton

Instructors S. Austin, B. Baker, B. Denny, C. Gervin, K. Randolph, W. Schmidt

A two-year graduate curriculum in physical therapy beginning in September, 1970, will be offered for students entering the field. The current certificate program will be discontinued following the graduation of presently enrolled students in December, 1970. The program of study leading to the Master of Science degree is designed to provide a broad foundation in the art and science of physical therapy and opportunities for elective course work in related fields—health administration, curriculum development and directed teaching in physical therapy, advanced clinical education, or research experience. Completion of the curriculum requires four semesters of full-time study and a summer practicum totalling 60 units of graduate course work, 38 of which are in physical therapy, 12 in designated courses in anatomy and physiology, and 10 in elective courses in related fields. Courses of instruction are listed in the *Bulletin of Duke University, The Graduate School*. Detailed information may be obtained from: Director of Graduate Studies, Department of Physical Therapy, Box 3247 Duke University Medical Center, Durham, North Carolina 27706.

Prosthetic and Orthopaedic Appliances

Assistant Professor B. Titus, *Director*; Assistant Prosthetist and Orthotist R. Gooch; Assistant Orthotist P. Ray

The function of this department is to produce prosthesis and orthopaedic appliances for the medical profession. Facilities for individual training in specific techniques or methods employed by this department are available. Those who complete four years' training are eligible to take the examination of American Board of Certification.

Radiologic Technology

Professor R. Lester, *Chairman of the Department of Radiology*; Assistant Professor J. Cahoon, *Director of the School of Radiologic Technology*; Professor G. Baylin; Associate Professors W. Barry, M. Capp, J. Goree, B. Worde, P. Cavanaugh; Assistant Professors I. Johnsrude, A. McCrae; Assistant to the Director B. Holtzman

Technical Instructors J. Miller, E. Porter, D. Riley, J. Rood, D. Inman, J. Sims, C. Kirby, B. Holtzman, J. Tennant, G. Carlson, B. Coman; *Radiological Safety Officer* C. Knight

The School of Radiologic Technology in the Department of Radiology offers students interested in the allied health sciences three programs of instruction.

The first, open to high school graduates and those with some college experience, consists of two calendar years of instruction and clinical training leading to certification by the American Registry of Radiologic Technologists.

The second, in affiliation with Elon College, enables students to obtain a Bachelor of Science degree in radiologic technology along with ARRT certification.

The third program provides a one-year graduate curriculum in either neuroradiography or vascular radiography for registered radiologic technologists.

The Duke School of Radiologic Technology is approved by the American College of Radiology, the American Medical Association's Council on Medical Education, the American Society of Radiologic Technologists, and the American Registry of Radiologic Technologists.

Certificate Program

Students participating in the two-year certificate program receive both academic and clinical training in all aspects of radiologic technology. At the conclusion of the program, the student is eligible to take the national board examinations sponsored by the American Registry of Radiologic Technologists. A student must pass the national boards before he is awarded a diploma from the school.

Candidates for admission must be graduates of accredited high schools and rank in the upper third of their class. Applicants with one or more years of college credit, however, are given priority.

Official transcripts of high school and/or college grades, a list of three references and a recent photograph must be included with a student's application. The school recommends that students be between the ages of 19 and 30 at the time of enrollment.

Final deadline for applications is July 15. A \$2 application fee made payable to the School of Radiologic Technology must accompany each application.

Students accepted into the program are required to pay a non-refundable \$100 registration fee to the University by September 1. Books, supplies and uniforms cost approximately \$175. Laundry of uniforms is provided by the medical center.

At the end of six months, if the student's work has been unsatisfactory or shows inaptitude for work in radiologic technology, he is advised to withdraw from the course.

At the successful completion of the first year of the course, the student receives a stipend of \$100 per month during his second year.

The Baccalaureate Program

Students pursuing a B.S. degree in radiologic technology take two years of work in liberal arts at Elon College and then come to Duke for the last two years of clinical training.

The program was established to resolve the acute shortage of radiologic technologists qualified for instructional and administrative positions.

Students receive the B.S. degree in radiologic technology from Elon College and a certificate from Duke after passing the national board examinations and the Duke section of the course.

Students entering this program must fulfill all entrance requirements of Elon College. Acceptance is based on high school records with emphasis on a student's rank in his class. Recommendations, scores on the Scholastic Aptitude Test of the College Entrance Examination Board, and scores on tests given by the high school are also considered. The completed application must be submitted to Elon College by March 1. A non-refundable application fee made payable to Elon College must be submitted with the application.

Upon acceptance, students must send a \$35 acceptance fee and a \$50 room reservation fee. Tuition, room, and board charges total \$1,585 each year at Elon. The acceptance fee and room reservation fee are subtracted from this total. Books and other expenses at Elon are estimated at \$100 per year.

At Duke, \$100 tuition must be paid to the University by July 1 prior to the third year. Books, supplies, and other expenses at Duke are estimated at \$175.

Upon successful completion of three years of the program, the student receives a stipend of \$100 each month during his final year.

Graduate Curriculum

The graduate program, open only to registered radiologic technologists, provides a one-year course in either neuroradiography or vascular radiography. The course consists of clinical work, with some research and experimental investigation. Students participating in the graduate curriculum are granted a \$100 stipend each month during the calendar year.

No living quarters are provided for paramedical students by Duke University, and students in radiologic technology live in town at their own expense. For further information or application blanks, write to John B. Cahoon, Jr., R.T., Director, School of Radiologic Technology, Duke University Medical Center, Durham, North Carolina 27706.

Veterinary Medicine

Associate Professor J. LeMay, *Chairman*; Assistant Professors B. Sherwood, J. Vakilzadeh

The function of this department is to facilitate the various teaching and research programs that require laboratory animals. Veterinary medical consultation is provided for research projects in which experiments are conducted on animals. Assistance is made available in selecting the most suitable species or strain of laboratory animal to use in a given study. In addition, animals are procured, quarantined, and appropriately conditioned in order to provide a highly reliable biological tool. A wide variety of technical services are carried on, such as providing whole blood of a variety of species, collecting biological specimens, providing clinical pathologic examinations, preparing animals for surgery, postsurgical care, and maintenance of the animal colonies.

The department collaborates with those departments of the School of Medicine that utilize laboratory animals in their teaching programs. Various disease states are experimentally produced in animals for student observation and study, and techniques for collecting biological specimens for additional study are demonstrated. Aid is given in setting up and carrying out these demonstrations and studies on animals.

The Veterinary medical staff teaches an introductory course in animal experimentation which is a required course for physician's assistant trainees. Plans are under way to make this course available to others and offer additional courses of study.

Research programs on some of the spontaneous diseases of laboratory animals are carried out by the staff both independently and with other Medical Center investigators.

Inhalation Therapy

The School of Inhalation Therapy is under the medical direction of the Department of Anesthesiology. It is accredited by the Council on Medical Education of the American Medical Association.

An eighteen-month course is offered which combines didactic instruction and on-the-job training. Approximately ten students are enrolled in this school each year. Graduate students are qualified to participate in National Board Exams. Associate degree programs are under development and will be offered by 1970.

All applicants must be high school graduates. Previous medical experience is desirable. A stipend commensurate with background and experience is offered. For detailed information, write to Houston R. Ander-

son, Director, School of Inhalation Therapy, Box 3094, Duke University Medical Center, Durham, North Carolina 27706.

Physician's Assistant Program

Professor E. H. Estes, Jr., *Chairman*; D. R. Howard, *Program Director*; J. C. Mau, *Administrative Director*; D. E. Lewis, *Director of Education*. Associate Professors J. A. Kylstra, J. C. LeMay, H. A. Saltzman, and A. G. Wallace. Assistant Professors F. P. Dalton, and J. A. McFarland. Associate B. F. Sherwood

Instructors K. G. Andreoli, J. A. Braun, S. R. Fortney, T. A. Huff, F. R. Johnston, J. J. McQueary, R. F. Neelon, and W. I. Sims

The Physician's Assistant Program, initiated in 1965, is designed to develop a new category of intermediate level professional assistants who will function as a member of the health team under the direction of physicians for the purpose of assisting them in areas of clinical and research endeavors.

The twenty-four month program is divided into a nine-month pre-clinical didactic section and a fifteen-month clinical section. The didactic section includes the courses History, Philosophy and Ethics of Medicine, Introduction to Basic Clinical Laboratory, Medical Records and Terminology, Introduction to Animal Experimentation, Introductory Chemistry, Anatomy and Physiology, Pharmacology, Metabolism, Advanced Laboratory and Clinical Procedures, Introduction to Clinical Medicine, Community Health, Medical Instrumentation, Physical Diagnosis, Introduction to Radiology, Fundamentals of Electrocardiography, and Basic Principles of Data Processing. The clinical section includes forty weeks of mandatory rotations and twenty-four weeks of elective rotations. Emphasis during the clinical experience is available in medicine, surgery, pediatrics, and several subspecialty areas.

Candidates for admission must be high school graduates with courses in math, chemistry, and biology and have at least three years of experience in the health field. There is no charge for tuition and the program is approved by the Veterans Administration for G. I. Bill benefits. The program is in a period of rapid growth and expansion which will accommodate increased numbers of students in the future. For further information, write to: Program Director, Physician's Assistant Program, P. O. Box 2914, Duke University Medical Center, Durham, North Carolina 27706.

Roster of Students

Class of 1973

Auerbach, Burt Jeffrey (Rutgers), North Plainfield, New Jersey
*Barton, Samuel Letcher (Duke), Richmond, Virginia
Benbow, John Miller (Davidson), Statesville, North Carolina
Bermanzohn, Paul Carl (City College of New York), Bronx, New York
Blumner, James (Yale), Durham, North Carolina
Cahill, James David, Jr. (Duke), Charlotte, North Carolina
Chatterton, Howard Treat (Harvard), Denver, Colorado
Cole, Thomas Carroll, Jr. (Univ. of Texas), Huntsville, Texas
Collins, Donald John (Mass. Inst. of Tech.), Minneapolis, Minnesota
Conley, Martin James, Jr. (Princeton), Ft. Lauderdale, Florida
Cooke, David Bennett, III (N. C. College), Durham, North Carolina
Coulam, Craig Merrill (Univ. of Utah), Salt Lake City, Utah
D'Angelo, Lawrence James (Harvard), Southington, Connecticut
Ducore, Jonathan Mark (Rutgers), Elberon, New Jersey
Durham, George Homer, II (Harvard), Durham, North Carolina
Edwards, Keith Robert (Williams), Lake Forest, Illinois
Eisenbarth, George Stephen (Columbia), Oxford, North Carolina
Ellett, James Wiley (Duke), Wilmington, Delaware
English, Peter Calvin (Duke), Durham, North Carolina
Eyler, Mary Etta (Duke), Wilmington, Delaware
Flickinger, Edward Garner (U.N.C.), Lima, Ohio
Frost, Richard Baylin (Wesleyan), Glens Falls, New York
Gnepp, Douglas Robbin (Drexel Inst. of Tech.), Philadelphia, Pennsylvania
Gordon, Richard Evans (Duke), Washington, D. C.
Grauerholz, John Edward (Duke), Durham, North Carolina
Hallett, John William, Jr. (U.S.A.F. Academy), Wheeling, West Virginia
Hanes, John Chisman, Jr. (Brown), Durham, North Carolina
Hardaker, William Thomas, Jr. (Univ. of Pennsylvania), Chapel Hill, North Carolina
Hartwig, Geoffrey Bryan (Univ. of So. Miss.), Hattiesburg, Mississippi
Hibler, Thomas Decatur, Jr. (Duke), Durham, North Carolina
Hopkins, Elwood Wilbur, III (Univ. of New Hampshire), Morrisville, North Carolina
Joyner, Ronald Wayne (U.N.C. at Chapel Hill), Durham, North Carolina
Kahler, Stephen Gregory (Princeton), Los Angeles, California
Karp, Daniel David (Harvard), Mattapan, Massachusetts
Kidd, John Graydon, Jr. (Univ. of Virginia), Bronxville, New York

*Withdrew voluntarily, 9-18-69.

Klaphaak, Peter John, Jr. (Mass. Inst. of Tech.), Westport, Connecticut
 Kline, Lanning Bernard (Univ. of Alberta), Edmonton, Alberta, Canada
 Krause, Robert Allen (Pennsylvania State), Durham, North Carolina
 Lawrason, Peter Douglas (Kenyon), Haverford, Pennsylvania
 Limbird, Thomas James (College of Wooster), Defiance, Ohio
 Lothman, Eric William (Duke), Kirkwood, Missouri
 Lowell, Seth Hawksworth (Indiana), Bloomington, Indiana
 McConaughy, Robert Schnoor (Univ. of Calif. at Berkeley), Redwood City, California
 McDonald, Dianne Kathleen (U.N.C.), Washington, D. C.
 McLean, George Wallace (U.N.C.), Clinton, North Carolina
 McNeer, James Frederick (Hampden-Sydney), Huntington, West Virginia
 Maier, Ronald Vitt (Notre Dame), Shadyside, Ohio
 Marion, Jeremiah Richard, III (Duke), Winston-Salem, North Carolina
 Martin, Scott Addington (Clemson), Rock Hill, South Carolina
 Mason, David Hout, Jr. (Williams), Castle Point, New York
 Miller, Joseph Matthew, Jr. (Johns Hopkins), Timonium, Maryland
 Moss, Jonathan (Harvard), Belmont, Massachusetts
 Nagey, David Augustus (Purdue), Bloomfield Hills, Michigan
 Nathan, Michael Roland (Duke), Durham, North Carolina
 Newman, Glenn Edwin (Duke), Clinton, North Carolina
 Norris, David Albert (Johns Hopkins), Towson, Maryland
 Ost Dahl, Roger Harold (Duke), Wilmington, Delaware
 Quinn, Graham Earl (Duke), Reston, Virginia
 Raizes, Gary Scott (Harvard), Mason City, Iowa
 Raugi, Gregory John (Brown), Atherton, California
 Rendall, John Lloyd, III (Harvard), Dellwood, Minnesota
 Robinson, Stuart Fleetwood (Pomona), Los Angeles, California
 Rosenblitt, Donald Lewis (Princeton), Flushing, New York
 Rosenblum, Joseph (Univ. of Connecticut), Waterbury, Connecticut
 Sam, James Edward (U. S. Military Academy), Sea Girt, New Jersey
 Scherer, Charles King (Princeton), Delray, Florida
 Schroeder, Terry Milton (Davidson), Charlotte, North Carolina
 Shaw, Dale Russell (Duke), Stewartstown, Pennsylvania
 Simon, Richard Henry (Univ. of Michigan), Huntington Woods, Michigan
 Slade, Clement Lawrence (Davidson), Jacksonville, Florida
 Sneiderman, Charles Alan (Univ. of Maryland), Wheaton, Maryland
 Solovieff, Gregory Vladimir (Columbia), Amityville, New York
 Strittmatter, Warren James (Dartmouth), Plainview, New York
 Sung, Chung-Shin (New York University), New York, New York
 Talmadge, John Mills, Jr. (Dartmouth), Big Spring, Texas
 Taylor, Lloyd McCully, Jr. (Colorado), Durham, North Carolina
 Thomas, Cornelius Bullard, Jr. (Duke), Atlanta, Georgia
 Walther, Philip John (Michigan State University), Van Wert, Ohio
 *Warren, George Hilliard, II (Harvard), Wellesley Hills, Massachusetts
 Watson, Donald Charles, Jr. (Stanford), Summit, New Jersey
 Weiner, Richard David (Univ. of Pennsylvania), Maitland, Florida
 Wesly, Robert Lawrence (Western Maryland), Severna Park, Maryland
 Wiener, Stephen R. (Yale), Portland, Oregon
 Williams, William Harrison, III (Wake Forest), Rock Hill, South Carolina
 Wilson, Joanne Peebles (U.N.C.-Chapel Hill), Raleigh, North Carolina
 Zwelling, Leonard Alan (Duke), North Bellmore, New York

*Withdrew voluntarily, 9-15-69.

Class of 1972

Alexander, John Charles (Duke), Rocky Mount, North Carolina
Andersen, Dana Kimball (Duke), Glen Cove, New York
Andrade, William George (Houston), Wichita Falls, Texas
Andrew, Clifford George (Columbia), Florissant, Missouri
Andrews, Michael Joseph (Guilford), Greensboro, North Carolina
Arvan, Glenn Douglas (Rochester), Scarsdale, New York
Barco, Daniel Harris (Allegheny), Medina, Ohio
Bley, Donald Edward (Johns Hopkins), Takoma Park, Maryland
Bornstein, Neal Gerald (Bowdoin), Swampscott, Massachusetts
Bowes, Pamela Zoe (Smith), Huntington, New York
Butts, John Davis (Duke), Closter, New Jersey
Butts, Nancy Tribble (Duke), Greenville, North Carolina
Carnavale, Nicholas Theodore (Arizona), Tucson, Arizona
Charney, James (Columbia), Hewlett, New York
Childs, Robert William (Princeton), Morgantown, West Virginia
Cohen, Lawrence Franklin (Dartmouth), Chevy Chase, Maryland
Copeland, Dana Derward (Rice), Baton Rouge, Louisiana
Dalton, James David (Duke), Asheboro, North Carolina
David, Clifford Baynes (Duke), Jacksonville, Florida
Davis, Glenn Craig (Reed), Durham, North Carolina
Drennan, Dale Clay (Pennsylvania), Barrington, Rhode Island
Duncan, Charles Cecil (Vanderbilt), Durham, North Carolina
Eckman, Laurie Nelson (Davidson), Houston, Texas
Engel, Susan Jean (Duke), Durham, North Carolina
Ewald, Thomas McConnell (West Virginia), New Martinsville, West Virginia
Forth, David Stephens (Duke), Roanoke, Virginia
Frey, James Lewis (Amherst), St. Louis, Missouri
Garr, David Ross (Duke), Miami, Florida
Goodman, William Bruce (Missouri), Kansas City, Missouri
Gordon, Gene Stephen (Colgate), Queens, New York
Grandis, Arnold Stephen (Washington & Lee), Richmond, Virginia
Gretes, John Constantine (Wake Forest), Norfolk, Virginia
Hankey, Terry Lee (Wright State), Dayton, Ohio
Haynes, James Hugh (Tennessee), Durham, North Carolina
Herpel, John Kling (Williams), Wallingford, Pennsylvania
Jarrett, David Bernard (Rochester), Flushing, New York
Jensen, Christian Edward (Univ. of Capetown), Leonardo, New Jersey
Kessler, Dale Leroy (Dartmouth), Durham, North Carolina
Lane, John Weston (Georgia), Avondale Estates, Georgia
Lawrence, John Elmore (North Carolina), Raleigh, North Carolina
Leight, George Staples (Davidson), Winston-Salem, North Carolina
Levitin, David Alan (Pittsburgh), New Haven, Connecticut
Levitt, Morton Hill (Princeton), Brooklyn, New York
Lewis, Mary Kendra (Duke), Swarthmore, Pennsylvania
Love, James McLean (Williams), Lincolnton, North Carolina
Luger, Alan Mark (Free University), Englewood, New Jersey
Lundy, Edmund George (Yale), Durham, North Carolina
McCarty, Kenneth Scott (Duke), Durham, North Carolina
McClure, Charles Gettys (Duke), Atlanta, Georgia
McMahon, Edward Matthew (Williams), Fair Haven, New Jersey
McRae, John Radford (Georgia Tech.), Augusta, Georgia
Martin, Samuel Preston (Yale), Gainesville, Florida

Michel, Randall George (Duke), Glendora, California
 Migliori, John Gererd (Dartmouth), Trenton, New Jersey
 Miller, Clinton Frederick, III (Yale), Wilmington, Delaware
 Mittler, Brant Steven (Harvard), Corpus Christi, Texas
 Oakes, Walter Jerry (Missouri), DeSoto, Missouri
 Oelrich, William Lyle (Davidson), Sanford, North Carolina
 Pearlman, Mark Howard (Williams), Rochester, New York
 Pehlke, Donald Michael (Harvard), Pacific Palisades, California
 Perry, Henry Baker (Duke), Greensboro, North Carolina
 Peterson, John Milton (Grinnell), Moline, Illinois
 Powell, Robert Charles (Shimer), Largo, Florida
 Rausch, Curt Norman (Yale), Angola, Indiana
 Rhodes, Glen Robert (Cornell), Queens, New York
 Rixse, Robert Sheldon (Johns Hopkins), Alexandria, Virginia
 Robison, George Randolph (Florida), Orlando, Florida
 Ryan, Paul Frederic (Univ. of Amsterdam), Chestnut Hill, Massachusetts
 Sanders, Lee (Swarthmore), Levittown, Pennsylvania
 Schiff, Richard Ivan (George Washington), Wheaton, Maryland
 Schmidt, Philip McKenzie (U. S. Air Force Academy), Durham, North Carolina
 Serwer, Gerald Arthur (Rice), Oklahoma City, Oklahoma
 Shangold, Mona Marlynn (Pennsylvania), Perth Amboy, New Jersey
 Sides, Paul J. (Centre), Lancaster, Kentucky
 Somers, William Alan (William & Mary), Lynchburg, Virginia
 Spaulding, Jean Gaillard (Columbia), Durham, North Carolina
 Starr, John Walter (Emory), Albany, Georgia
 Taylor, Harvey Grant (U. S. Military Academy), Houston, Texas
 Tschang, Tai Po (Southern Illinois), Shatin, NT, Hong Kong
 Weisiger, Richard Atlee (Princeton), Potomac, Maryland
 Welch, Nancy Mae (Lynchburg), Orlando, Florida
 Wellman, David Kenton (Duke), Huntington, West Virginia
 Wheeler, Clifton Cannady (Davidson), Durham, North Carolina
 Widness, John (Amherst), Lynnfield, Massachusetts
 Willis, John Kelter, II (Duke), Johnson City, Tennessee
 Wilson, Jeffrey Wellington (Duke), Pittsburgh, Pennsylvania
 Wittig, John Henry (State Univ. of New York at Buffalo), Buffalo, New York
 Woodhall, Philip Barnes (Georgia), Macon, Georgia

Class of 1971

Abraham, Gerald Michael (Brown), New York, New York
 Ahmann, Gerald Black (Duke), St. Charles, Missouri
 Alpert, Eric David (Dartmouth), New Bedford, Massachusetts
 Ball, John Robert (Emory), Auburn, Alabama
 Barnes, Robert Paul (U.S. Air Force Academy), Edmonds, Washington
 Baten, Michael (Pennsylvania), Paterson, New Jersey
 Beach, Roberta Kay (Duke), Winston-Salem, North Carolina
 Behringer, Frederick Richard, Jr. (Dartmouth), Baltimore, Maryland
 Belmaker, Elaine Zarembka (Radcliffe), St. Louis, Missouri
 Belmaker, Robert Henry (Harvard), North Miami Beach, Florida
 Beuttel, Stephen Charles (Wake Forest), Pleasantville, New Jersey
 Boehm, Timothy Michael (George Washington), Alexandria, Virginia
 Boleman, Patricia Audrey (Manhattanville), New York, New York
 Brater, Donald Craig (Duke), Oak Ridge, Tennessee

Buckley, David Kennedy (Notre Dame), Ft. Lauderdale, Florida
 Buffington, Joseph Suttles (Davidson), Lithonia, Georgia
 Cies, William Andrew (Stanford), San Marino, California
 Cobbs, Walter Herbert, III (Harvard), Cincinnati, Ohio
 Colpitts, Michael Ralph (Stanford), Maryville, Tennessee
 Corless, Joseph Michael (Georgetown), North Bergen, New Jersey
 Cox, Edwin Baggett (Vanderbilt), Nashville, Tennessee
 Croker, Byron P., Jr. (Pittsburgh), Pittsburgh, Pennsylvania
 Curry, Robert Whitney, Jr. (Florida), Orlando, Florida
 Davis, Holly Wilson (Duke), Richmond, Virginia
 Ell, Michael Arthur (Florida State), Sarasota, Florida
 Felsenfeld, Arnold Jay (Columbia), North Arlington, New Jersey
 Fichtelman, Jon Robert (Duke), Lake Worth, Florida
 Fischer, Kenneth C. (Duke), Brooklyn, New York
 Gilmore, Robert William (U.S. Air Force Academy), East Liverpool, Ohio
 Goscin, Stephen André (Princeton), Richardson, Texas
 Haliasos, Constantine Athan (Virginia), Danville, Virginia
 Hartley, David Paul (New), Wheatland, Wyoming
 Hawkins, Hal Kenneth (Rice), Bartlesville, Oklahoma
 High, William Lank (Duke), Boone, North Carolina
 Hoffman, Philip G. (Rice), Houston, Texas
 Horne, McDonald Kelso, III (Princeton), Memphis, Tennessee
 Horowitz, Alan Jay (Harvard), Brooklyn, New York
 Hourigan, Philip Anthony, Jr. (Yale), Milford, Connecticut
 Hoverman, John Russell (Dartmouth), Seaford, New York
 Hybarger, Charles (Duke), Beltsville, Maryland
 Jaffe, Charles J. (Johns Hopkins), Merion, Pennsylvania
 Johnson, Van Warren (Yale), St. James, Minnesota
 Jones, Georgeanna Secgar (Mount Holyoke), Baltimore, Maryland
 Juk, Steven Stanley, Jr. (South Carolina), Georgetown, South Carolina
 Kaufman, Michael David (Union), Mahwah, New Jersey
 Kelemen, Marcia Ann (Mount Holyoke), West Long Branch, New Jersey
 Krackow, Kenneth Alan (Johns Hopkins), Durham, North Carolina
 Lake, Charles Raymond (Tulane), Shreveport, Louisiana
 Leonard, Stephen David (Oberlin), Kew Gardens, New York
 Linfors, Eugene William (Johns Hopkins), Rodman, Canal Zone
 Liptak, Gregory Stephen (Connecticut), Stratford, Connecticut
 Lloyd, Douglas Seward (Duke), Suffield, Connecticut
 Lynch, Phillip Irving, Jr. (Princeton), Pittsburgh, Pennsylvania
 Maack, Walter Carl (Antioch), Woodstown, New Jersey
 Major, Leslie Franklin (Rochester), Binghamton, New York
 Margolis, Robert Jay (Rutgers), Pompton Lakes, New Jersey
 Maulitz, Russell Charles (Imperial), Birmingham, Alabama
 McConnell, David Moffatt, Jr. (Haverford), Chapel Hill, North Carolina
 McCormick, Joseph Benford (Florida Southern), Georgetown, Indiana
 McGuire, John O'Brien (Davidson), Charlotte, North Carolina
 Miller, Donald Max (Florida State), Blountstown, Florida
 Miller, Robert David (Davidson), Chapel Hill, North Carolina
 Modlin, John Frederic (Duke), Columbia, Missouri
 Mohl, Paul Cecil (Harvard), South Orange, New Jersey
 Nash, Michael Lawrence (State Univ. of New York at Stony Brook), Far Rockaway,
 New York
 Neskodny, Jeane Marie (Radcliffe), Oak Brook, Illinois
 Norton, Linda Eck (Duke), Baltimore, Maryland

Oates, Theodore Kensell (Washington and Lee), Martinsburg, West Virginia
 Perlstein, Robert Stephen (Williams), New York, New York
 Peterson, Eric Webster (Washington and Jefferson), Emporium, Pennsylvania
 Pilot, Mitchell Charles (Jefferson Medical College), Hammond, Indiana
 Pizzo, Salvatore Vincent (St. Joseph's), Philadelphia, Pennsylvania
 Podgainy, Helen Joan (Old Dominion), Norfolk, Virginia
 Poindexter, James Randolph Gordon (Yale), Mt. Crawford, Virginia
 Prince, Susan Robertson (North Carolina), Knightdale, North Carolina
 Rapchik, Joel (Brooklyn), Brooklyn, New York
 Rawl, John Callison (South Carolina), Lexington, South Carolina
 Robertson, Lee Joslyn (Stanford), Santa Barbara, California
 Ross, Charles William (Rutgers), North Bergen, New Jersey
 Rothstein, Thomas Lane (George Washington), Arlington, Virginia
 Rutherford, Richard Leslie (Notre Dame), Endwell, New York
 Saikley, Garrett Frank (Johns Hopkins), Arlington, Virginia
 Scardino, Peter Thomas (Yale), Savannah, Georgia
 Schwartz, Martin Lerner (Pennsylvania), Philadelphia, Pennsylvania
 Shelburne, John Daniel (North Carolina), Raleigh, North Carolina
 Slater, Evan Dexter (Amherst), Riverside, Connecticut
 Smith, Fredrica Emrich (Bryn Mawr), Atlanta, Georgia
 Sontag, Kurt Warren (Colorado), Yellow Springs, Ohio
 Stevens, Richard Carter (Columbia), Schenectady, New York
 Thomas, Bernard Spencer (Johns Hopkins), Silver Spring, Maryland
 Timmons, James McKnight, Jr. (Davidson), Columbia, South Carolina
 Victor, Stephen Jan (Columbia), New York, New York
 Wagner, William Orr (Duke), Upland, California
 Waite, Robert Sears (Duke), Atlanta, Georgia
 Walker, John Allen (Columbia), Brooklyn, New York
 Walker, Leo Lauhon (Duke), Springfield, Virginia
 Ward, Jonathan Melvin (Davidson), Charlotte, North Carolina
 Waterbor, Robert Bertram (Harvard), Fairless Hills, Pennsylvania
 Waugh, Lyndon Dale (Dartmouth), Huntington, West Virginia
 Welch, William Robert (Tufts), Newark, New York
 Wexler, John Paul (Hobart), Brooklyn, New York
 Wilson, James Miller, III (Emory), Gainesville, Georgia
 Wood, Eugene Walter (Tennessee), Millington, Tennessee

Class of 1970

Aksel, Sezer (Duke), Izmir, Turkey
 Angelillo, John Charles (St. Louis), Durham, North Carolina
 Austin, Thomas Edward (Florida), Umatilla, Florida
 Ayars, Paul Kenneth, Jr. (Dartmouth), Bridgeton, New Jersey
 Baggs, William Jerold (Duke), Reston, Virginia
 Ballenger, James Caudell (North Carolina), Raleigh, North Carolina
 Black, Edward Barnwell (Univ. of the South), Greenville, South Carolina
 Boaz, David Earnhardt (Pennsylvania State), Gainesville, Florida
 Bost, Ronald Eugene (Maryland), Temple Hills, Maryland
 Busby, Merle Rudy (Johns Hopkins), Salisbury, North Carolina
 Campbell, Carlos Clinton, III (Haverford), Knoxville, Tennessee
 Caughey, Dale Wells (Bucknell), Binghamton, New York
 Clark, Arthur Watts, Jr. (Davidson), Durham, North Carolina
 Cohen, Harvey Joel (Brooklyn College), Durham, North Carolina
 Coleman, Michael Dortch (Arkansas), Memphis, Tennessee

Comiter, Henry Joseph (Alfred), New York, New York
 Conetta, Donald Anthony (New York), Stamford, Connecticut
 Engel, Peter Allen (Dartmouth), Rochester, New York
 Everhart, Floyd Richard, Jr. (Princeton), West Palm Beach, Florida
 Forth, Paul Taber, Jr. (Duke), Roanoke, Virginia
 Ghanem, Elias Farid (North Carolina at Charlotte), Haifa, Israel
 Gill, Lowell Harley (Gettysburg), River Edge, New Jersey
 Gold, Philip William (Duke), Newport News, Virginia
 Gordon, Robert (Brandeis), Coral Gables, Florida
 Green, Linda Darlene (Rice), Falls Church, Virginia
 Gwynne, John Thomas (Princeton), Morgantown, West Virginia
 Harrison, Thomas Edward (Tufts), Line Lexington, Pennsylvania
 Head, Harold David (Washington and Lee), Lexington, Virginia
 Horton, John Andrew (Columbia), Harrison, New York
 Jeffords, Dexter Lee (Duke), Roslyn, New York
 Jenkins, Ewin Burrow (Tennessee), Knoxville, Tennessee
 Jones, Edwin Lee, III (Duke), Charlotte, North Carolina
 Karlin, Jan Victor (Harvard), Waterbury, Connecticut
 Kelly, Gregory Allen (Vanderbilt), Knoxville, Tennessee
 Kelly, James Reginald (South Carolina), Columbia, South Carolina
 Kinney, Thomas Roberts (Duke), Durham, North Carolina
 Kizer, John Stephen (Princeton), Charleston, West Virginia
 Kutner, William Alvin (State Univ. of New York at Fredonia), Dunkirk, New York
 Lewis, Barnett William (Davidson), Lakeland, Florida
 Lord, Guy Russell, Jr. (Reed), San Francisco, California
 Lord, Patricia Lawlor (Reed), Oakland, California
 Marchand, Anthony (Connecticut), Greenwich, Connecticut
 Marusov, Paul Nicholas (Rice), Verona, Pennsylvania
 Mason, Janet (Mount Holyoke), Orange, New Jersey
 Maw, Gilbert Maylon (Utah), Salt Lake City, Utah
 McGuffin, William Lewis, Jr. (Georgia Inst. of Tech.), Greeneville, Tennessee
 Miller, James Alan (Ohio), Charleston, West Virginia
 Miller, Joseph Paul (Hull), Beaumont, Texas
 Miller, Margaret Walker (Duke), Durham, North Carolina
 Miller, Walter Luther (Massachusetts Inst. of Tech.), Nazareth, Pennsylvania
 Needel, Norman Howard (Rutgers), West Hyattsville, Maryland
 O'Neill, William Mansfield, Jr. (California), Albuquerque, New Mexico
 Palko, Daniel Berhardt (Brown), Passaic, New Jersey
 Pease, Howard Francis (Bowdoin), New Milford, Connecticut
 Pfautz, Carolyn June (Houghton), Tarentum, Pennsylvania
 Reiley, Thomas Trevor (Purdue), Cincinnati, Ohio
 Reynolds, Charles Philip, III (Purdue), Lake Forest, Illinois
 Rogol, Alan David (Massachusetts Inst. of Tech.), Seymour, Connecticut
 Scales, Susan Margaret (Rice), Colorado Springs, Colorado
 Schmits, Walter Richard, Jr. (Rochester), Demarest, New Jersey
 Schostal, Clifford J. (Rochester), Livingston, New Jersey
 Silberberg, William Paul (Duke), Woodbridge, Connecticut
 Silver, Carol Diana (Richmond), Richmond, Virginia
 Smith, Forrest Owen (San Francisco State), Aliquippa, Pennsylvania
 Smith, Harold A., Jr. (Colgate), Marlton, New Jersey
 Smith, William Thomas (Hiram), Warren, Ohio
 Sohn, Stephen Allan (Harvard), Newton, Massachusetts
 Somers, William Robert (Duke), Oak Ridge, Tennessee

Stead, Nancy White (Duke), Durham, North Carolina
Tucker, William Kirkby (Johns Hopkins), Chevy Chase, Maryland
Valiant, Martha Eloise (Miami), Durham, North Carolina

Class of 1969 With Internship Appointments

Alexander, Robert Wayne (Doraville, Ga.), Duke Hospital, Durham, North Carolina
Ayer, Frederick, III (South Hamilton, Mass.), Duke Hospital, Durham, North Carolina
Bierfeld, James Louis (Highland Park, Ill.), Jackson Memorial Hospital, Miami, Florida
Boylston, James Alan (Columbia, S.C.), Duke Hospital, Durham, North Carolina
Budd, Daniel Claude (Hillsdale, N.J.), Presbyterian Hospital, New York, New York
Carmalt, E. Duane (Ft. Lauderdale, Fla.), Univ. of Oklahoma Hospitals, Oklahoma City, Oklahoma
Cato, Allen Easley, Jr. (Moultrie, Ga.), N.C. Memorial Hospital, Chapel Hill, North Carolina
Chang, Jack Han-Teh (New York, N.Y.), Colorado Medical Center, Denver, Colorado
Cheek, Jack Allan, Jr. (Durham, N.C.), Duke Hospital, Durham, North Carolina
Cook, Jay David (Hammond, Indiana), Duke Hospital, Durham, North Carolina
Crowe, John Kenyon (Cape Girardeau, Mo.), Mayo Grad. Sch. of Med., Rochester, Minnesota
Cruikshank, Dwight Phelps, IV (Parkersburg, W. Va.), Duke Hospital, Durham, North Carolina
Davis, Arthur Brian (Raleigh, N.C.), Univ. of Virginia, Charlottesville, Virginia
de Vito, Peter Carl (Glen Ridge, N.J.), Yale-New Haven Medical Center, New Haven, Connecticut
Dixon, Richard Hoyt (Durham, N.C.), Duke Hospital, Durham, North Carolina
Dunn, Neil Marshall (Kingsville, Texas), Duke Hospital, Durham, North Carolina
Edwards, Diane Rose (Sanford, N.C.), Univ. of Minnesota, Minneapolis, Minnesota
Elson, Melvin Leslie (Chattanooga, Tenn.), Vanderbilt Univ. Hosp., Nashville, Tennessee
English, Thomas L. (East Point, Ga.), University Hospitals, Cleveland, Ohio
Entmacher, Michael S. (Durham, N.C.), Duke Hospital, Durham, North Carolina
Fauntleroy, Thomas Waring, Jr. (Coraopolis, Pa.), Duke Hospital, Durham, North Carolina
Foster, Charles Stephen (Durham, N.C.), Duke Hospital, Durham, North Carolina
Fox, James Wesley (Sacramento, Calif.), Presby-Pacific Med. Center, San Francisco, California
Gagliano, Angelo Vincent (New York, N.Y.), Medical College of Va., Richmond, Virginia
Gellar, Richard (Brooklyn, N.Y.), Swedish Hospital, Seattle, Washington
Gentzler, Richard David, II (Spring Grove, Pa.), Duke Hospital, Durham, North Carolina
Gervin, Alfred Spencer (Richmond, Va.), Duke Hospital, Durham, North Carolina
Giles, Harlan Raymond (Avondale Estates, Ga.), Duke Hospital, Durham, North Carolina
Goldberg, Bertram (Elkins Park, Pa.), Walter Reed Army Hospital, Washington, D.C.
Grimson, Baird Sanford (Durham, N.C.), University Hospitals, Iowa City, Iowa

Gruenwald, Charles, Jr. (Martinsburg, W. Va.), Downstate Medical Center, New York, New York

Haberkern, Roy Conrad, III (Garden City, N.Y.), Duke Hospital, Durham, North Carolina

Henderson, Richard Albert, III (Fair Oaks, Calif.), Memorial Hospital, Long Beach, California

Hill, David P. (Wheeling, W. Va.), University Hospitals, Columbus, Ohio

Hoover, Eddie L. (Charlotte, N.C.), Duke Hospital, Durham, North Carolina

Horten, Bruce Karl (Ft. Mill, S.C.), Duke Hospital, Durham, North Carolina

Jackson, Don Jobe (McKenzie, Tennessee), Wm. A. Shands Hospital, Gainesville, Florida

Jenkins, James Hobart (Carbondale, Ill.), Univ. of Calif., San Diego, California

Johnson, James Frederick (Washington, D.C.), Ben Taub Childrens Hospital, Houston, Texas

Karsh, Richard B. (East Rockaway, N.Y.), Cincinnati General Hospital, Cincinnati, Ohio

Keats, Philip Kummel (West Orange, N.J.), Duke Hospital, Durham, North Carolina

Kernodle, Harold Barker, Jr. (Burlington, N.C.), Vanderbilt Hospital, Nashville, Tennessee

Kirkpatrick, Douglas Bernard (Yellow Springs, Ohio), Univ. of Calif. Hosp., Los Angeles, California

Koff, Stephen A. (Long Beach, N.Y.), N.Y. Memorial Hospital, New York, New York

Labance, Michael John (Phil., Pa.), Tampa General Hospital, Tampa, Florida

Lawrence, Dale Nolan (Cincinnati, Ohio), University of Texas, San Antonio, Texas

Levie, Benton Bains (Albertville, Alabama), Duke Hospital, Durham, North Carolina

Levy, Steven T. (Forest Hills, N.Y.), Mass. General Hospital, Boston, Massachusetts

Lonon, Robert Warren, Jr. (Charlotte, N.C.), Mercy Hospital, San Diego, California

Malone, Charles Bruce, III (Arlington, Texas), University Hospitals, Cleveland, Ohio

Marafioti, Richard Lynn (Rochester, N.Y.), Strong Memorial Hospital, Rochester, New York

Marger, Donald (Miami, Fla.), Wilford Hall, Lackland AFB, San Antonio, Texas

Masters, Stuart Jeffrey (Roslyn Heights, Long Island, N.Y.), Duke Hospital, Durham, North Carolina

Megna, Daniel (Staten Island, N.Y.), USPHS, Staten Island, New York

Meyer, Alan Howard (Great Neck, N.Y.), Univ. of Utah Affiliated Hospitals, Salt Lake City, Utah

Moore, Dan Cockrill (Memphis, Tenn.), Childrens Medical Center, Boston, Massachusetts

Moorefield, William G., Jr. (Martinsville, Va.), Univ. of Alabama Med. Center, Birmingham, Alabama

Morawetz, Richard Bacon (Jefferson, Ga.), Univ. of Utah Affiliated Hosps., Salt Lake City, Utah

Morriss, Mary Jeannette (Fairfax, Va.), Georgetown Univ. Hosp., Washington, D.C.

Newman, Larry Bernard (Memphis, Tenn.), Barnes Hospital, St. Louis, Missouri

Remigailo, Richard Vladimir (Arlington, Va.), The N.Y. Hospital, New York, New York

Rienstra, Joseph Douwe (Houston, Texas), Kaiser Foundation, Oakland, California

Rummo, Nicholas John (Brooklyn, N.Y.), Roosevelt Hospital, New York, New York

Smith, Charles Donovan (Memphis, Tenn.), Duke Hospital, Durham, North Carolina

Tremaine, Myron David (Chicago, Ill.), Letterman Gen. Hosp., San Francisco, California

Utey, Henry Griffith (Dixon, Ill.), St. Joseph's Hosp., Phoenix, Arizona

Valle, David (Leawood, Kansas), Johns Hopkins Hospital, Baltimore, Maryland

Volberg, Frank Marshall (Kingsport, Tenn.), Grady Memorial Hospital, Atlanta, Ga.

Waggoner, David Michael (Grosse Pointe, Michigan), Cleveland Metropolitan,
Cleveland, Ohio
Whitfield, Richard Wriston (Houston, Texas), Texas Medical Center, Houston, Texas
Williams, Randal James (Durham, N.C.), Duke Hospital, Durham, North Carolina
Wise, Thomas Nathan (Washington, D.C.), I & III Tufts, Boston, Massachusetts
Zavelson, Thomas Michael (Mansfield, Ohio), William A. Shands Hosp., Gainesville,
Florida



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1970

JULY

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BULLETIN OF DUKE UNIVERSITY

School of Engineering

1970



Annual Bulletins

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Cover design is adapted from a photograph of a carving in the entrance to Crowell Quadrangle.

BULLETIN OF DUKE UNIVERSITY

School of Engineering
1970-1971

Durham, North Carolina 1970

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June 1970

Number 9

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University Calendar 1970-1971

1970

September

- 15 Tuesday, 7:30 p.m.—Orientation begins: assemblies for all new students entering the School of Engineering, Trinity College, The Woman's College, and the School of Nursing
- 17 Thursday—Registration and matriculation of freshmen students of the School of Engineering, Trinity College, The Woman's College, and the School of Nursing
- 18 Friday—Registration and matriculation of all new and non-pre-registered students in the Graduate School; School of Engineering, Trinity College, The Woman's College, and the School of Nursing transfer and returning students who have not pre-registered
- 19 Saturday—Final registration of preregistered students
- 21 Monday, 9:00 a.m.—Fall semester classes begin

November

- 16 Monday—Last day for reporting mid-term grades
- 16-19 Preregistration for spring semester 1971
- 25 Wednesday, 12:30 p.m.—Thanksgiving recess begins
- 30 Monday, 9:00 a.m.—Classes are resumed

December

- 11 Friday—Founders' Day
- 18 Friday, 6:00 p.m.—Christmas recess begins

1971

January

- 4 Monday, 9:00 a.m.—Classes are resumed
- 13 Wednesday—Fall semester *graduate* classes end
- 15 Friday, 6:00 p.m.—Fall semester *undergraduate* classes end

- 14-19 Thursday-Tuesday—*Graduate* reading period
- 16-19 Saturday-Tuesday—*Undergraduate* reading period
- 20 Wednesday—Final exams begin
- 29 Friday—Final exams end

February

- 4 Thursday—Registration and matriculation of new students
- 6 Saturday—Last day for matriculation for spring semester
- 8 Monday, 9:00 a.m.—Spring semester classes begin

March

- 24 Wednesday—Last day for reporting mid-term grades
- 26 Friday, 6:00 p.m.—Spring recess begins

April

- 5 Monday, 9:00 a.m.—Classes are resumed
- 12-15 Preregistration for Summer Session and fall semester 1971
- 30 Friday—Spring weekend, *undergraduate* classes not held

May

- 17 Monday—Spring semester *graduate* classes end
- 18-22 Tuesday-Saturday—*Graduate* reading period
- 20 Thursday, 6:00 p.m.—Spring semester *undergraduate* classes end
- 21-22 Friday, Saturday—*Undergraduate* reading period
- 24 Monday—Final exams begin

June

- 2 Wednesday—Final exams end
- 5 Saturday—Commencement begins
- 6 Sunday—Commencement Sermon
- 7 Monday—Graduating exercises

Officers of Administration

General University Administration

Terry Sanford, LL.B., *President*

Barnes Woodhall, M.D., *Chancellor pro tem*

Marcus E. Hobbs, Ph.D., *Provost*

Charles B. Huestis, *Vice President for Business and Finance*

William G. Anlyan, M.D., *Vice President for Health Affairs*

Frank Leon Ashmore, A.B., *Vice President for Institutional Advancement*

Gerhard Chester Henriksen, M.A., C.P.A., *Vice President and Treasurer*

Everett Harold Hopkins, M.A., LL.D., *Vice President for Regional Programs*

Harold Lewis, Ph.D., *Vice Provost and Dean of Faculty*

John C. McKinney, Ph.D., *Vice Provost and Dean of the Graduate School*

James L. Price, Jr., Ph.D., *Vice Provost and Dean of Undergraduate Education*

Craufurd David Goodwin, Ph.D., *Vice Provost and Director of International Programs*

Benjamin Edward Powell, Ph.D., *Librarian*

Clark R. Cahow, Ph.D., *University Registrar*

Rufus H. Powell, LL.B., *Secretary of the University*

Stephen Cannada Harward, A.B., C.P.A., *Assistant Secretary and Controller*

Edwin Constant Bryson, LL.B., *University Counsel*

Engineering Administration

George Wilbur Pearsall, Sc.D., *Acting Dean and Director of Research and Development*

Edward Kready Kraybill, Ph.D., *Associate Dean for Undergraduate Study*

John C. McKinney, Ph.D., *Dean of the Graduate School*

Aleksandar Sedmak Vesić, D.Sc., *Chairman, Department of Civil Engineering*
Harry Ashton Owen, Jr., Ph.D., *Chairman, Department of Electrical Engineering*
Jack Bartley Chaddock, Sc.D., *Chairman, Department of Mechanical Engineering*
Theo Clyde Pilkington, Ph.D., *Chairman, Division of Biomedical Engineering*
Charles Morgan Harman, Ph.D., *Research Coordinator*
Mrs. Dorothy Holt McElduff, A.B., *Recorder*



Fatigue testing of prestressed concrete beam

Faculty and Teaching Staff

Department of Civil Engineering

Chairman: Aleksandar Sedmak Vesic

Director of Undergraduate Studies: Edward Henry Bryan

Director of Graduate Studies: Bruce J. Muga

*Earl Ivan Brown, II (1960), Ph.D. (Texas), *J. A. Jones Professor of Civil Engineering*

*Edward Henry Bryan (1960), Ph.D. (Wisconsin), *Professor of Civil Engineering*

*Aleksandar Sedmak Vesic (1964), D.Sc. (Belgrade), *Professor of Civil Engineering*

†*David William Hill (1962), Ph.D. (Stanford), *Associate Professor of Engineering Mechanics*

Sudhir Kumar (1958), Ph.D. (Pennsylvania State), *Adjunct Associate Professor of Civil Engineering*

*Bruce J. Muga (1967), Ph.D. (Illinois), *Associate Professor of Civil Engineering*

*Aubrey Edwin Palmer (1944), C.E. (Virginia), *Associate Professor of Civil Engineering*

*K. Pete Arges (1953), M.S.C.E. (Tennessee), *Assistant Professor of Civil Engineering*

G. Wayne Clough (1969), Ph.D. (California at Berkeley), *Assistant Professor of Civil Engineering*

George Jiri Dvorak (1967), C.Sc. (Prague), Ph.D. (Brown), *Assistant Professor of Civil Engineering*

James F. Wilson (1967), Ph.D. (Ohio State), *Assistant Professor of Civil Engineering*

*Frederick G. Sheppard (1962-1966) (1968), M.S. (Duke), *Part-time Instructor in Civil Engineering*

*Registered Professional Engineer.

†Resigned effective January 31, 1970.

Department of Electrical Engineering

Chairman: Harry Ashton Owen, Jr.

Director of Undergraduate Studies: Otto Meier, Jr.

Director of Graduate Studies: John Leslie Artley

John Leslie Artley (1955), D.Eng. (Johns Hopkins), *Professor of Electrical Engineering*

Robert Blackburn Kerr (1965), D.Eng. (Johns Hopkins), *Professor of Electrical Engineering*

Otto Meier, Jr. (1934), Ph.D. (Pennsylvania), *Professor of Electrical Engineering*

Harry Ashton Owen, Jr. (1951), Ph.D. (North Carolina State), *Professor of Electrical Engineering*

Theo Clyde Pilkington (1958), Ph.D. (Duke), *Professor of Electrical Engineering and Professor of Biomedical Engineering*

*Philip Harold Trickey (1965), M.S.E.E. (Maine), *Visiting Professor of Electrical Engineering*

*Thomas George Wilson (1959), Sc.D. (Harvard), *Professor of Electrical Engineering*

Herbert Hacker, Jr. (1965), Ph.D. (Michigan), *Associate Professor of Electrical Engineering*

William Thomas Joines (1966), Ph.D. (Duke), *Associate Professor of Electrical Engineering*

*Edward Kready Kraybill (1939), Ph.D. (Michigan), *Associate Professor of Electrical Engineering*

Peter Nick Marinos (1968), Ph.D. (North Carolina State) *Associate Professor of Electrical Engineering*

†Loren William Nolte (1966), Ph.D. (Michigan), *Associate Professor of Electrical Engineering*

‡Billy Brown Olive (1957), B.S. in E.E. (Duke); J.D. (St. John's), *Adjunct Associate Professor of Engineering Law*

Fredrick Louis Thurstone (1967), Ph.D. (North Carolina State), *Associate Professor of Electrical Engineering and Associate Professor of Biomedical Engineering*

*Bruce Arrington Wells (1964), M.S.E.E. (Oregon State), *Associate Professor of Electrical Engineering*

Rhett Truesdale George, Jr. (1957), Ph.D. (Florida), *Assistant Professor of Electrical Engineering*

Paul Pao-Shih Wang (1968), Ph.D. (Ohio State), *Assistant Professor of Electrical Engineering*

*Registered Professional Engineer.

†Absent on leave, 1969-70.

‡Registered Patent Attorney.

Department of Mechanical Engineering

Chairman: Jack Bartley Chaddock

Director of Undergraduate Studies: Van Leslie Kenyon, Jr.

Director of Graduate Studies: Charles Morgan Harman

- *Jack Bartley Chaddock (1966), Sc.D. (Massachusetts Institute of Technology), *Professor of Mechanical Engineering*
- *Van Leslie Kenyon, Jr. (1945), M.M.E. (Delaware), *Professor of Mechanical Engineering*
- *Lambert Sigfred Linderth, Jr. (1965), M.E. (Iowa State) *Professor of Mechanical Engineering*
- *John Nelson Macduff (1956), M.M.E. (New York University), *Professor of Mechanical Engineering*
- *James Lathrop Meriam (1963), Ph.D. (Yale), *Professor of Engineering Mechanics*
- George Wilbur Pearsall (1964), Sc.D. (Massachusetts Institute of Technology), *Professor of Mechanical Engineering*
- Howard G. Clark (1968), Ph.D. (Maryland), *Associate Professor of Mechanical Engineering and Associate Professor of Biomedical Engineering*
- *Ernest Elsevier (1950), M.S.M.E. (Georgia Institute of Technology), *Associate Professor of Mechanical Engineering*
- *Charles Morgan Harman (1961), Ph.D. (Wisconsin), *Associate Professor of Mechanical Engineering*
- James Joseph Murray (1954), S.M. (Chicago), *Adjunct Associate Professor of Mechanical Engineering*
- *Gale Herbert Buzzard (1957), Ph.D. (North Carolina State), *Assistant Professor of Mechanical Engineering*
- *Ralph Elton Lewis (1941), M.S.M.E. (Illinois), *Assistant Professor of Mechanical Engineering*
- *Thomas Hawkes Nash, Jr. (1959), B.S. (Iowa State), M.A. (North Carolina), *Assistant Professor of Mechanical Engineering*
- Marion LaVerne Shepard (1967), Ph.D. (Iowa State), *Assistant Professor of Mechanical Engineering*
- Daniel P. Werner (1968), Ph.D. (Michigan), *Assistant Professor of Mechanical Engineering*
- Donald Wright (1967), Ph.D. (Purdue), *Assistant Professor of Mechanical Engineering*

Division of Biomedical Engineering

Chairman: Theo Clyde Pilkington

Director of Undergraduate Studies: Howard G. Clark

Director of Graduate Studies: Fredrick L. Thurstone

*Registered Professional Engineer.

Theo Clyde Pilkington (1958), Ph.D. (Duke), *Professor of Biomedical Engineering and Professor of Electrical Engineering*
 Howard G. Clark (1968), Ph.D. (Maryland), *Associate Professor of Biomedical Engineering and Associate Professor of Mechanical Engineering*
 Brian A. Hills (1968), Ph.D. (Adelaide), *Associate Professor of Experimental Surgery and Associate Professor of Biomedical Engineering*
 Fredrick L. Thurstone (1967), Ph.D. (N. C. State), *Associate Professor of Biomedical Engineering and Associate Professor of Electrical Engineering*
 Roger C. Barr (1968), Ph.D. (Duke), *Assistant Professor of Pediatrics and Assistant Professor of Biomedical Engineering*
 William E. Hammond (1968), Ph.D. (Duke), *Assistant Professor of Community Health Sciences and Assistant Professor of Biomedical Engineering*
 Howard Wachtel (1967), Ph.D. (New York), *Assistant Professor of Biomedical Engineering and Assistant Professor of Physiology*
 Myron L. Wolbarsht (1968), Ph.D. (Johns Hopkins), *Lecturer in Biomedical Engineering; Professor of Ophthalmology; and Associate Professor of Physiology*

Engineering Administrative Council

Chairman: Acting Dean G. W. Pearsall
Associate Dean for Undergraduate Study: E. K. Kraybill
Biomedical Engineering: T. C. Pilkington
Civil Engineering: A. S. Vesic
Electrical Engineering: H. A. Owen, Jr.
Mechanical Engineering: J. B. Chaddock
Research Coordinator: C. M. Harman

Engineering Faculty Council

Chairman: J. L. Artley
Secretary: D. Wright
Biomedical Engineering: R. C. Barr
Civil Engineering: E. I. Brown, II, B. J. Muga
Electrical Engineering: J. L. Artley, T. G. Wilson
Mechanical Engineering: M. L. Shepard, D. Wright
Ex Officio: G. W. Pearsall

Faculty Emeritus

Harold Crusius Bird, C. E., *Professor Emeritus of Civil Engineering*
 Frank Nicholas Egerton, A.M., E.E., *Associate Professor Emeritus of Electrical Engineering*

Howard N. Haines, B.S. in Architecture, *Associate Professor Emeritus of Civil Engineering*
 William Holland Hall, A.M., M.S.C.E., *Dean Emeritus, J.A. Jones Professor Emeritus of Engineering*
 Walter James Seeley, M.S., *Dean Emeritus, James B. Duke Professor Emeritus of Electrical Engineering*
 †Ralph Sydney Wilbur, M.E., *Professor Emeritus of Mechanical Engineering*
 James Wesley Williams, M.S., *Professor Emeritus of Civil Engineering*

Board of Visitors

E. A. Bescherer	George R. Herbert	Robert H. Pinnix
Norman T. Buddine	J. Herbert Hollomon	Joseph B. Platt
Carl C. Chambers	Edwin L. Jones, Sr.	W. Brewster Snow
Carl F. Floe	William S. Lee	F. W. Steckmest
H. L. Flowers	M. P. O'Brien	Hugh E. Whitted, Jr.
R. G. Folsom		

Supporting Staff

Librarian: Joe C. Rees, M.S.L.S.
Recorder: Mrs. Dorothy Holt McElduff, A.B.
Director, Engineering Services: Joseph Philip Edwards*

Clerical and Technical

Lester Barham, *Laboratory Technician in Electrical Engineering*
 Shirley Candace Batts, *Secretary, Dean's Office*
 Mrs. Leon S. Brooks, *Secretary, Electrical Engineering Department*
 Mrs. Spurgeon G. Buchanan, *Administrative Secretary to the Dean*
 John Leonard Carroll, *Shop Superintendent, Civil Engineering*
 William Glenwood Clayton, *Instrument Maker in Mechanical Engineering*
 Larry Andrew Dowell, *Electronic Technician, Central Services*
 James Edward Grasty, *Assistant Technician in Mechanical Engineering*
 Mrs. John H. Gurley, *Secretary, Mechanical Engineering Department*
 Jimmy R. Hartley, *Electronics Technician in Electrical Engineering*
 Dyson W. Hickingbotham, *Instrument Maker, Central Services*
 Mrs. James A. Humphries, *Secretary, Dean's Office*
 Marvin Primo King, *Laboratory Technician in Civil Engineering*

*Registered Professional Engineer.

†Deceased September 20, 1969.

William Thomas Lessig, *Engineering Illustrator, Central Services*
Mrs. Robert G. Pate, *Secretary, Electrical Engineering Department*
Robert Lee Penley, *Electronics Technician in Electrical Engineering*
Mrs. William Perry, *Secretary, Mechanical Engineering Department*
James Harold Phillips, *Electronics Technician in Electrical Engineering*
Albert Richard Rade, *Technical Photographer, Central Services*
John E. Rice, *Laboratory Mechanic in Mechanical Engineering*
Ben Herman Rimer, *Electronics Technician in Electrical Engineering*
Mrs. Ronald Russell, *Secretary, Civil Engineering Department*
Susan A. Shelby, *Secretary, Division of Biomedical Engineering*
Mrs. Dorothy S. Stephenson, *Secretary, Central Services*
Alonzo George Vaughan, *Laboratory Technician in Civil Engineering*
Mrs. David T. Wells, *Library Assistant*
Mrs. Minnie K. Williams, *Secretary, Civil Engineering Department*



General Information

Duke University

Duke University, a privately supported institution of higher education in Durham, North Carolina, has about 8,000 students enrolled in ten divisions: Trinity College and The Woman's College (undergraduate liberal arts colleges for men and women); the Graduate School and the Graduate School of Business Administration; and the professional schools—Divinity School, Schools of Engineering, Forestry, Law, Medicine, and Nursing. Annually, student enrollments represent nearly every state and approximately sixty-five foreign countries. The University is a member of the Southern Association of Colleges and Schools and of the Association of American Universities. The University also holds institutional membership in relevant professional societies, including the Engineering College Administrative Council and the Engineering College Research Council of the American Society for Engineering Education.

As part of the University community, students in the engineering programs share in a total educational experience that only a major university can provide.

The Profession of Engineering

Throughout history engineering has continually interacted with the

rest of human society in a highly determinative way. Its influence is evident in the very fabric of our culture. Engineering has provided the means for feeding, clothing, and sheltering mankind. It has largely freed man from physical drudgery and from the slavery of routine mental effort. It has provided the tools of new scientific discovery, as well as those of new art forms. It has provided the means of bringing to mankind everywhere the results of the creative efforts of the great artists, writers, scientists, and philosophers of both ancient and modern times. It has placed man in close contact with his fellowmen throughout the world, and recently has been concerned with placing man on the moon. The engineer achieves imaginative new solutions to many of the very real problems that confront mankind.

No simple formal definition suffices to portray the multifaceted activity which is engineering. A partial picture is afforded by the statement that "engineering is the profession in which knowledge of mathematics and the physical sciences is applied to develop ways of utilizing economically the materials and forces of nature for the well-being of mankind." The engineer fully utilizes scientific principles and concepts. However, the modern practice of engineering is interdisciplinary, and the engineer must be both scientist and artist, both theoretician and pragmatist, both analyst and synthesist. In the words of the late Theodore von Karman: "The scientist explores what is; the engineer creates what has never been." The modern engineer has the need to be broad as well as deep in his knowledge and interests, and his education must reflect this need.

Engineering at Duke University

The environment in which an engineer is educated is as important in shaping his future as what he learns in the classroom. At Duke this environment has two major components: one component, an environment of modern technology, derives from the research and design being conducted by faculty and students in the School; but just as important is the second component, the liberal arts environment of a major university with a strong tradition in the arts and sciences.

Engineering is not a homogeneous discipline because it requires so many specialties. For example, some faculty members in the School of Engineering are designers; they are problem-oriented, and they are concerned with teaching students how to solve problems—how to synthesize relevant information and ideas and apply them in a creative, feasible design. Other engineering faculty members function like scientists; they are more method-oriented, and their research is focused on using the techniques of their discipline to investigate various natural phenomena.

Modern engineers must be educated by professionals whose experi-

ences range across the entire spectrum of engineering—from design to science. They must also develop the facility to reason and to communicate in at least two “languages”: English and mathematics; and they must understand man in both a private and a social context if they are to apply technology to the improvement of life. These are the aims which account for the details of the engineering curriculum: courses in engineering, natural science, mathematics, English, social sciences, and humanities.

Graduates of the Duke School of Engineering are employed both as practicing engineers and as managers. Many enter graduate schools for further education in a professional specialty: engineering, medicine, law, business administration, science, and divinity. All graduates are eligible to take the Engineer-in-Training examination—the first step toward licensing as a Professional Engineer.

Both on the campus and in the classroom the emphasis is on the individual. To this end classes are kept small and close contact is maintained between professor and student. As a matter of policy, the School is relatively small, with an undergraduate enrollment of about 500. Master's and doctoral work in engineering is offered through the Graduate School.

History

The School of Engineering of Duke University offers programs of instruction and research at all three degree levels: bachelor's, master's, and doctor's. The School traces its origin to 1851, when the catalogue of Normal College, the forerunner of Trinity College and Duke University, advertised a “Classical” course which included surveying in the sophomore year and architecture and engineering for seniors. Similar offerings characterized instruction in engineering throughout the seventy-three-year period of the institution's operation as Trinity College.

With the change of name to Duke University in 1924 and the concomitant rapid evolution of the institution to its present status as a major university, the program in engineering entered a period of vigorous development which is still under way. Separate departments were established for civil engineering and electrical engineering in 1927, and for mechanical engineering in 1931. In 1937 these three departments were administratively grouped to form the Division of Engineering, which in 1939 was incorporated into the University structure as the College of Engineering, one of three coordinate undergraduate colleges of Duke University. Through the Graduate School, the College began offering work leading to the Master of Science degree in 1957, and to the Doctor of Philosophy degree in 1960. In September, 1966, the name of the College was changed to School of Engineering in recognition of its professional status and of the stature that it had achieved in its program

of graduate study and research. A Division of Biomedical Engineering, with both undergraduate and graduate programs, was formed in 1967.

Organization

The affairs of the School of Engineering are administered by the Dean of the School, with the assistance of the Engineering Administrative Council which includes the Associate Dean, the chairmen of the departments of engineering, and the research coordinator. The affairs of each department of engineering are administered by the chairman of that department, with the assistance of the department faculty. Much of the administrative work of the School is carried out with the assistance of faculty committees.

The graduate programs are administered by the respective engineering departments in coordination with the Graduate School of the University.

The legislative body of the School of Engineering is its faculty, which is composed of the President, the Provost, and the Secretary of the University; all members of the university faculty in the School of Engineering; the Director of Undergraduate Admissions for the School of Engineering; and four members from arts and sciences who are elected



Digital data processing facility in an electrical engineering laboratory.

annually by the faculty of the School of Engineering, one from mathematics, one from the natural sciences, and one each from two of the following three areas: humanities, social sciences, and history. The engineering faculty has responsibility for the curriculum and for determining policies in those academic matters that pertain exclusively to the School and subject to the regulations of the University faculty and its recognized legislative bodies.

The Engineering Faculty Council is composed of two representatives of each of the departments, and one representative of the division of biomedical engineering, of the School of Engineering. One of the representatives of each department is elected by the members of the faculty in that department from their own group, and one is elected from each department by vote of the entire faculty of the School of Engineering. The Dean of the School of Engineering is a member *ex-officio*. The EFC elects its own chairman and secretary, the latter serving also as secretary to the faculty of the School. The Council functions as a steering committee for the faculty: its responsibilities include the preparation of agenda for meetings of the faculty and service as the Committee on Faculty Committees.

Physical Plant

The School is in a single building, first occupied in January, 1948, on the West Campus. Each of three wings houses the instructional and research laboratories and the special classrooms of one of the engineering departments. The building also has offices, classrooms, and other general facilities including a library of some 42,000 volumes and 500 periodicals; an auditorium where audiovisual instruction can be given to large groups; conference rooms and seminar rooms; a student lounge; design rooms; special facilities for preparing and for reproducing copy of various types; research-supporting central precision machine shop and electronics shop; and central, as well as departmental, computation facilities. The central computation facilities include a console with direct access to a large-scale IBM Model 360/75 computer.

Rapid evolution of the program of graduate study and research, and the accompanying growth of the faculty and staff, have made increasing demands on the physical plant. Accordingly, plans are under study for the enlargement of physical facilities for the School.

Programs of Study and Requirements for Degrees

The degree of Bachelor of Science in Engineering (B.S.E.) is offered with majors in biomedical, civil, electrical, or mechanical engineering, and in selected interdisciplinary areas. Through the Graduate School it also provides work leading to the degree of Master of Science (M.S.) and to the degree of Doctor of Philosophy (Ph.D.) in biomedical, civil, electrical, or mechanical engineering.

Undergraduate Degree Offered

Bachelor of Science in Engineering

The School offers a four-year program leading to the degree of Bachelor of Science in Engineering (B.S.E.), with majors in the professional fields of biomedical, civil, electrical, and mechanical engineering. Special programs of study in interdisciplinary fields, such as energy conversion, engineering mechanics, materials science, ocean engineering, pollution control, systems and controls, and urban engineering, leading to the B.S.E. degree may be arranged with approval of the engineering faculty. The programs in civil, electrical, and mechanical engineering are accredited by the Engineers' Council for Professional Development, and

the School of Engineering is seeking accreditation for the newly established biomedical engineering curriculum.

For graduation with a Bachelor of Science in Engineering degree, a student entering after September 1, 1969, must complete successfully a minimum of 32 semester courses plus four physical education activity courses. These 32 semester courses must include the following:

General Requirements

- English..... 1 s.c. This requirement is met by completion of English 1.
- Mathematics..... 4 s.c. This requirement is met by completion of Mathematics 31, 32, 73, and 74.
- Natural Science..... 3 s.c. This requirement is met by completion of Chemistry 1 and Physics 51 and 52.
- Social Sciences
and Humanities..... 4 s.c. This requirement is met by completion of four courses from at least two departments in the humanities and social sciences. This program of courses should reflect a rationale or fulfill an objective appropriate to the engineering profession. Courses selected must be those which present essential subject matter and substance of the discipline; for example, no introductory skill courses may be used to satisfy this requirement. Likewise, courses devoted primarily to subjects such as accounting, industrial management, finance, personnel administration, introductory language, and ROTC normally do not fulfill this objective regardless of their general value in the total engineering curriculum.
- Engineering and
Applied Sciences..... 3 s.c. This requirement is met by completion of at least one course from each of three of the following four areas: electrical science, materials science, mechanics, and thermal science. See major programs, which follow, for specific course suggestions.

Digital Computation.....Students are expected to have acquired a digital-computer programming capability before their sophomore year.

Major Requirements

Major Specifications....17 s.c. The department or division administering the major field of study will specify the nature of this requirement. In general it will consist of both required courses and electives to be planned in consultation with the departmental adviser. See major programs, which follow.

*Total Minimum
Requirement..... 32 s.c.

Suggested Program of Studies for the Freshman Year

<i>First Semester</i>	<i>Courses</i>	<i>Second Semester</i>	<i>Courses</i>
Chem 1—Gen. Inorg.			
Chemistry	1	Phys 51—Gen. Physics	1
Engl 1—Freshman Composition .	1	Math 32—Introd. Math Anal ...	1
Math 31—Introd. Math Anal ...	1	Elective†	1
Elective†	1	Elective†	1
PE—Physical Education		PE—Physical Education	
	<u>4†</u>		<u>4†</u>

*A maximum of two semester courses of junior or senior level air science or naval science course work may be counted in satisfying the minimum requirements of 32 semester courses for a baccalaureate degree in engineering. These courses must be included in the 17 s.c. listed under major specifications. All other courses completed in air science or naval science are taken in addition to the minimum program.

†Each student is encouraged to plan a program designed for his individual needs. His faculty adviser will be available to assist him beginning with the opening of Freshman Week. Advice should be sought relative to the most effective use of electives in relation to the special requirements of the various engineering majors.

It should be noted that students are expected to have acquired a digital-computer programming capability before their sophomore year.

‡The normal load each semester is four courses (or an equivalent combination of courses, half-courses, and double courses). Engineering students taking air science or naval science may need to schedule a course in military science as a supplement to the normal load.

Department of Civil Engineering

Comprising a very broad scope of activities, civil engineering is usually defined as the art of conception, design, analysis, and building of constructed facilities. However, the demands of contemporary civil engineering practice have transcended the traditional character of this oldest branch of engineering, and the modern civil engineer may find himself engaged in problems such as trafficability of planetary surfaces, exploitation of mineral deposits of ocean bottoms, or optimization of an urban transportation system.

There are six major specialty areas of civil engineering. *Hydraulic and ocean engineering* deals with the development and use of water and marine resources. This may include such diverse activities as multi-purpose reservoir development for flood control, hydroelectric power production, navigation, irrigation and recreation purposes, or it may take the form of facilities for wasteways, locks, river regulation, drainage, harbor development, coastal and tidal protection works, and offshore and submerged structures for marine resource development. *Structural engineering* is concerned with economical and safe design of all kinds of engineering structures such as public and industrial buildings, bridges, telecommunication and industrial towers, concrete dams, as well as aerospace and marine facilities such as radio-telescopes, missile launching pads, shore structures, and so forth. *Transportation engineering* deals with problems of design and construction, maintenance and administration of traffic facilities such as railroads, highways, airports, waterways, pipelines, and subways, as well as with planning and management of transportation systems. *Geotechnical engineering* is concerned with interaction between engineering structures and the earth's crust, with particular emphasis on foundations and underground structures, as well as on structures constructed of earth as a material (earth dams, highway, and airfield sub-grades). *Sanitary engineering* deals with the quality of human environment and includes consideration of economic and health aspects of municipal and industrial water supply, wastewater treatment and disposal, solid wastes and the impact of intensive utilization of land, water and air resources on their ability to sustain urban growth. Finally, *urban engineering* encompasses a broad spectrum of integrated technological problems of urban areas such as land and city planning and development, mass transportation, public health and safety.

In view of the mentioned diversity of future professional activities of a civil engineer, his undergraduate education should include a breadth of knowledge in engineering and physical sciences as well as in humanities and social and biological sciences. Graduates of civil engineering curricula find employment with consulting offices, construction firms, industries, and federal, state, and local government. However, many civil engineers,

particularly those with advanced degrees, engage in private practice as consulting engineers and independent designers, as well as in management planning, research, and teaching.

The *Structural Engineering Laboratory* is equipped to give instruction in the basic principles of stress and strain and for the testing of structural members. Included in this laboratory are universal testing machines with capacities to 400,000 pounds; hardness testers; machines for testing torsion, fatigue, and impact; calibration apparatus; and a variety of modern strain gages.

For research and instruction in *structural mechanics* the department has facilities for the construction and testing of structural models, including medium-speed electronic equipment for the measurement and recording of strains and displacements. Stress analysis facilities include a 10" research polariscope, brittle lacquer equipment, a reflection polariscope for use with photoelastic coatings, cameras for micro and macro-photography, and a large-sized Begg's deformeter.

The *Soil Mechanics Laboratory* includes an outstanding variety of modern testing equipment and instruments. Particularly notable are the static and dynamic model testing accessories, as well as a high-pressure triaxial shear apparatus, designed for testing of soil and rock samples up to 2.8 inches in diameter at confining pressures up to 100,000 pounds per square inch.

The *Fluid Mechanics Laboratory* is equipped for instruction and research in selected areas of hydro-mechanics. For instruction, there is a portable transparent open channel flume, a portable wind tunnel with transparent test section, and a reservoir with connecting pipe and return channels for closed conduit flow. For research, equipment includes a 28 foot long, 15 inch wide, 18 inch depth water wave flume with paddle-type variable frequency, constant amplitude, wave generator. Sensors include parallel-wire resistance type wave probes and strain gaged pressure, force, and moment sensors. The instrumentation system provides recording of up to six channels of information, to the same time base, on a photographic-type oscillograph. A transparent test section permits visual observation of selected phenomena.

The *Sanitary Engineering Laboratory* is equipped for instruction and research in the characterization of waters and wastewaters and for the application of biological, chemical, and physical treatment methods to improve their quality.

The *Materials Laboratory* has the equipment necessary for both research and instruction in the physical properties and stress-deformation characteristics of bituminous mixtures and concretes.

The department has a representative collection of *surveying equipment*: transits, levels, plane tables, accessory equipment, precise levels, and theodolites.

*Program of Study in Civil Engineering for the Bachelor of Science in Engineering Degree**

For freshman year see page 8.

Sophomore Year

<i>First Semester</i>	<i>Courses</i>	<i>Second Semester</i>	<i>Courses</i>
†Egr 75—Mechanics of Solids ..	1	‡CE 16—Surveying	½
Math 73—Interm. Math Anal ..	1	‡Egr 11—Visual Communica-	
Phys 52 General Physics	1	tion	½
§Approved Elective	1	EE 63—Electric Networks	1
PE—Physical Education		Egr 83 Structure of Solids	1
		Math 74—Interm. Math Anal ..	1
		PE—Physical Education	
	<u>4</u>		<u>4</u>

Junior Year

<i>First Semester</i>	<i>Courses</i>	<i>Second Semester</i>	<i>Courses</i>
CE 131—Struct. Anal. I	1	CE 123 Water Resources	1
Egr 123—Dynamics	1	CE 133 Struct. Design I	1
Egr 145—Fluid Mechanics	1	Egr 104 Heat Transfer	1
§Approved Elective	1	§Approved Elective	1
	<u>4</u>		<u>4</u>

Senior Year

<i>First Semester</i>	<i>Courses</i>	<i>Second Semester</i>	<i>Courses</i>
CE 124—Environment Engrg. .	1	CE 116—Transportation	1
CE 134—Struct. Design II	1	§Approved Elective	1
CE 139—Soil Mechanics	1	§Approved Elective	1
§Approved Elective	1	§Approved Elective	1
	<u>4</u>		<u>4</u>

*For students entering after September 1, 1969. Students who entered prior to September, 1969, should consult their faculty advisers.

†Students having completed CE 12 should substitute CE 73 for Egr 75.

‡May be taken in the freshman year.

§Part of a program of elective courses planned with departmental approval to suit the interests and abilities of the individual student. In addition to satisfying the social science-humanities requirement of the School of Engineering the program must include a minimum of one elective course in the natural sciences. The program should also include a minimum of three *emphasis electives*, designed to reinforce the student's major area of study; at least one emphasis elective must be a civil engineering course.

First Graduate Year

The Master of Science program is planned as the fifth year of a five-year sequence of studies. Admission to the master's program follows completion of the requirements for the Bachelor of Science in Engineering degree (at Duke University), or its equivalent (from another institution), and is contingent upon admission to the Graduate School.

First Semester		Second Semester	
	units		units
CE 200- or 300-level course . .	3	CE 200- or 300-level course . .	3
CE 200- or 300-level course . .	3	CE 200- or 300-level course . .	3
*Minor course	3	*Minor course	3
Approved elective course	3	Approved elective course	3
†Thesis research	3	†Thesis research	3
	15		15

*Normally mathematics or natural science.

†With the approval of the department, a student may choose, in lieu of thesis requirement, to complete six (6) additional units of course work plus a special project. If the student elects this alternative, he is expected to take a comprehensive examination over his graduate course work, and to defend orally his special project.

Subsequent Graduate Study

For further information concerning work leading to the M.S. degree, as well as that leading to the Ph.D. degree, refer to regulations covering graduate degrees and to civil engineering graduate courses.

Department of Electrical Engineering

Electrical engineering utilizes the electrical and magnetic forces of nature and properties of matter to supply human needs. To an increasing degree its products and services influence the daily living of most of the world's population. It is concerned with the *processing and transmitting of information*—as in radar, television, telemetry, measurement, electronics, computation, and control. It is equally concerned with the *processing, transmitting, and controlling of energy*—as in solid state converters, magnetohydrodynamic generators, nuclear reactors, rotating machines, power systems, and automatic industrial processes. It provides most of our labor-saving home appliances and many of the instruments of modern scientific research and of modern medical practice.

The professional electrical engineer may engage in consulting, teaching, research, development, design, manufacturing, operation, maintenance, management, and sales. His education must therefore provide a fundamental understanding of both the science of electrical engineering, which

is based on mathematics and the physical sciences, and the art of electrical engineering, which depends on human imagination and judgment. It must also prepare him to be a responsible member of society by providing him with an appreciation of the humanities and the social sciences.

The program in electrical engineering at Duke, therefore, does not stress the mere acquisition of specific skills and methods, but seeks, in both classroom and laboratory, to stimulate students to think creatively in terms of fundamental concepts. It is hoped that, once started, creativity may become a habit. Such a program requires an able staff, extensive library resources, and well-equipped laboratories, such as are found here. The range of interests in electrical engineering which are included in this program may be conveyed by a brief survey of the laboratory activities.

The *Solid-State Materials Laboratory* is well equipped for both instructional and research projects in which the macroscopic properties of materials, as exploited in devices, are studied at the microscopic and molecular levels. An X-ray diffraction diffractometer, a 9½-inch magnet, a spin-echo spectrometer, a vacuum deposition system, and metallurgical and stereoscopic microscopes are utilized in this work.

In the *Ferromagnetics Laboratory* investigations are being conducted into such properties of ferromagnetic materials as magneto-thermal, magneto-optical, magneto-resistive, and magneto-strictive effects.

Research in the *Superconducting Circuits and Thin-Films Laboratory* is directed toward exploiting for engineering application some of the unique physical phenomena which are observed to obtain at temperatures in the vicinity of absolute zero. Related thin-film research is in progress. A major facility of this laboratory is an electron microscope providing a resolution of 7 Å.

The *Electronics Laboratory* is equipped for the study of the physical behavior of basic electronic components and of advanced electronic devices and circuits.

In the *Energy Conversion Laboratory* the principles of generation, transformation, and control of energy are studied as they are applicable to large-scale power systems and small self-contained systems. Thermo-electric generators, photovoltaic sources, transformers, a-c and d-c motors and generators, and their associated controls are included in this work.

In the *Automatic Control Systems Laboratory* studies are made of the principles underlying the fields of instrumentation and automatic control. Modern, high-performance equipment is available for synthesizing control systems and for determining control system performance.

In the work of the *Spacecraft Systems Laboratory* principles from all phases of electrical engineering are brought to bear upon problems encountered in modern spacecraft technology.

In the *Spacecraft Telemetry Systems Laboratory* research centers on

processing techniques for the recovery of information contained in noisy signals received from scientific satellites and space probes.

In the *Microwave Circuits Laboratory* studies are made of microwave circuits and systems using both time-domain reflectometry and swept-frequency techniques. Applications to radar and communication systems are shown.

The *Cryomagnetic Materials Laboratory* is equipped for research in the area of magnetic susceptibilities of materials at very low temperatures.

The *Digital Systems Laboratory* is utilized in instruction and research in the investigation of digital communications and logic systems. An on-line general purpose digital computer is available to this laboratory and others for signal processing and for simulation studies.

In the *Underwater Acoustic Communications Laboratory* the design and performance of optimum receivers for processing underwater acoustic signals is being investigated.

The *Digital Data Processing Laboratory* is equipped with a small general-purpose computer with a number of peripheral accessories for permitting on-line data processing. In addition, the computer is used with four teleprinter stations in a time-sharing mode for processing student programs written in FOCAL, an interpretive conversational language.

Program of Study in Electrical Engineering for the Bachelor of Science in Engineering Degree*

General Requirements

†English.....	1 s.c.	
†Mathematics.....	4 s.c.	
†Natural Science.....	3 s.c.	
†Social Sciences and Humanities.....	4 s.c.	
Engineering and Applied Sciences....	2 s.c.	In materials science, thermal science, or mechanics.
	1 s.c.	EE 63—Electric Networks.
†Digital Computation..	Capability required	

Major Requirements

Mathematics.....	1 s.c.	Mathematics elective beyond Math 74.
Basic Science.....	1 s.c.	Basic science elective. (In addition to 3 s.c. in natural science listed under general requirements.)

*For students entering after September 1, 1969. Students who entered prior to September, 1969 should consult their faculty advisers.

†Refer to page 7 for details of these general requirements.

Social Sciences and Humanities.....	2 s.c.	Social sciences-humanities elective (in addition to 4 s.c. listed under general requirements).
Courses in Major.....	1 s.c.	EE 113—Introductory System Theory.
	1 s.c.	EE 143—Fields and Continua.
	4 s.c.	EE electives.
Approved Electives....	1 s.c.	Must be an engineering science course taught within the School of Engineering.
Approved Electives....	2 s.c.	Must be in engineering science, phys- ical science, or mathematics.
Approved Electives....	<u>4 s.c.</u>	
Total Minimum Requirement	32 s.c.	

First Graduate Year

The Master of Science program is planned as the fifth year of a five-year sequence of studies. Admission to the Master's program follows completion of the requirements for the Bachelor of Science in Engineering degree (at Duke University), or its equivalent (from another institution), and is contingent upon admission to the Graduate School.

First Semester		Second Semester	
	units		units
EE 200- or 300-level course ...	3	EE 200- or 300-level course ...	3
EE 200- or 300-level course ...	3	EE 200- or 300-level course ...	3
*Minor course	3	*Minor course	3
Approved elective course	3	Approved elective course	3
†Thesis research	3	†Thesis research	3
	<u>15</u>		<u>15</u>

Subsequent Graduate Study

For further information concerning work leading to the M.S. degree, as well as that leading to the Ph.D. degree, refer to regulations covering graduate degrees, and to electrical engineering graduate courses.

*Normally mathematics or natural science.

†A non-thesis option is available. This option requires that the student obtain departmental approval and that he complete six units of course work in lieu of the thesis research. In addition, a student exercising this option must pass an examination administered by his departmental advisory committee.

Department of Mechanical Engineering

Mechanical Engineering is concerned with research, development, and design in many areas: (1) propulsion and energy conversion, (2) machines and systems for production, (3) instrumentation and control mechanisms, (4) environmental control, and (5) ocean and space systems. It is perhaps the broadest in scope of all the engineering fields.

The curriculum in mechanical engineering provides many alternate programs of study. Basic tools acquired in mathematics, the natural and physical sciences, and the engineering sciences are applied to such fields as thermodynamics, heat transfer, fluid mechanics, vibrations, and mechanical design.

The normal mechanical engineering curriculum covers a breadth of subjects and is designed to provide thorough preparation for graduate study as well as professional work at the baccalaureate level. However, the curriculum has been designed with sufficient flexibility that the student can emphasize thermal and fluid sciences, mechanical systems design, or materials science, as well as construct interdisciplinary programs in such fields as ocean engineering, transportation systems, biomechanics, and many others. The flexibility inherent in the curriculum also affords the student an opportunity to study, in depth, subjects outside of engineering. This opportunity was motivated by the ever increasing importance of the requirement that engineers be more cognizant of the nontechnical ramifications of their work.

The impact of the digital computer on engineering is so great that it requires special mention. The programming skill, referred to in the section on General Requirements, is normally obtained by successfully completing one of several introductory courses (ME 31, Egr 31, or Math 51). It is expected that students will make use of this training in many courses, e.g., Egr 72, ME 123, ME 141, ME 136 and ME 177, throughout their program.

Undergraduate laboratories provide unique environments for learning experiences and the development of professional attitudes and approaches to typical engineering problems. The mechanical engineering program includes laboratories for system dynamics, materials development and processing, thermal and fluid systems, system response and control, and senior projects.

The *System Dynamics Laboratory* introduces fundamentals of instrumentation and dynamic system response. The main focus of the laboratory is techniques of simulation.

The *Materials Laboratory* provides modern equipment for the preparation, testing, and microscopic examination of material samples over a broad range of conditions. Metals, polymers, and ceramics, as well as naturally occurring materials are included. Advanced project work uses

such special equipment as ultrasonic generators, injection molders, heat treating furnaces, an arc-melting furnace, and a differential thermal analyzer.

In the *Thermal and Fluid Systems Laboratory* studies are conducted on such equipment as analog computers, heat exchangers, refrigeration compressors, a research engine, hydraulic loops, and a vacuum-propulsion system. Instrumentation includes a Mach-Zender interferometer, thermocouple data systems, engine indicators, constant-temperature anemometers, proximity probes, pressure transducers, flow meters, and associated analyzers and recorders. New additions will include a wind tunnel and radiation heat transfer equipment.

The *System Response and Control Laboratory* permits study of dynamic response on a programmable electrodynamic shaker, shock stand, and with mechanical, magnetic, and acoustic exciters. Oscillators, narrow and broad band frequency generators, spectrum analyzers, filters, magnetic tape recorders, and other modern instrumentation provide the diagnostic means for visualization, analysis, and interpretation. Stability and response of automatic control systems are studied with analog computers and with some real hardware systems, including an autopilot.

In the *Senior Projects Laboratory* the student identifies a need for experimentation, designs his "model," and instruments it to provide the desired data on an advanced project of his choosing. Oral and written presentation of the results are an integral part of the laboratory experience.

Program of Study in Mechanical Engineering for the Bachelor of Science in Engineering Degree*

General Requirements

†English.....	1 s.c.	
†Mathematics.....	4 s.c.	
†Natural Science.....	3 s.c.	
†Social Sciences and Humanities.....	4 s.c.	
Engineering and Applied Sciences....	1 s.c.	†Egr 72—Introd. to System Dynamics
	1 s.c.	†Egr 75—Mechanics of Solids
	1 s.c.	†Egr 83—Structure and Properties of Solids
†Digital Computation..	Capability required	

*For students entering after September 1, 1969. Students who entered prior to September, 1969, should consult their faculty advisers.

†Refer to page 7 for details of these general requirements.

†A program of study in the Department of Mechanical Engineering must contain a minimum of nine subjects taught within the School of Engineering. These nine courses form the foundations of a normal mechanical engineering program.

Major Requirements

Mathematics.....	1 s.c.	Mathematics elective beyond Math 74.
Natural Science.....	1 s.c.	Natural science elective (in addition to 3 s.c. listed under general requirements).
Social Sciences and Humanities.....	1 s.c.	Social science-humanities elective (in addition to 4 s.c. listed under general requirements).
Courses in Major.....	1 s.c.	‡ME 101—Thermodynamics
	1 s.c.	‡ME 123—Dynamics
	1 s.c.	‡ME 126—Fluid Mechanics
	1 s.c.	‡ME 136—Response of Systems
	1 s.c.	‡ME 141—Mechanical Design
	1 s.c.	‡ME 150—Heat and Mass Transfer
Emphasis Electives....	4 s.c.	Advanced technical electives, chosen to emphasize a professional objective in the curriculum.
Approved Electives....	4 s.c.	
Total Minimum Requirement	<u>32 s.c.</u>	

First Graduate Year

The Master of Science program is planned as the fifth year of a five-year sequence of studies. Admission to the master's program follows completion of the requirements for the Bachelor of Science in Engineering degree (at Duke University), or its equivalent (from another institution), and is contingent upon admission to the Graduate School.

First Semester

units

ME 200- or 300-level course ..	3
ME 200- or 300-level course ..	3
†Minor course	3
Approved elective course	3
Thesis research	3
	<u>15</u>

Second Semester

units

ME 200- or 300-level course ..	3
ME 200- or 300-level course ..	3
†Minor course	3
Approved elective course	3
Thesis research	3
	<u>15</u>

‡A program of study in the Department of Mechanical Engineering must contain a minimum of nine subjects taught within the School of Engineering. These nine courses form the foundations of a normal mechanical engineering program.

†The minor is normally mathematics. A non-thesis option is available. This option requires that the student obtain departmental approval and that he complete six additional units of course work in place of the thesis research. In addition, a student exercising this option must complete a project satisfactory to his Advisory Committee and pass an examination administered by this committee.

Subsequent Graduate Study

For further information concerning work leading to the M.S. degree, as well as that leading to the Ph.D. degree, refer to regulations governing graduate degrees, and to mechanical engineering graduate courses.

Division of Biomedical Engineering

Biomedical engineering is often defined as the application of the concepts and methods of the physical, mathematical, and engineering sciences to biology and medicine. This definition covers a very broad spectrum ranging from formalized mathematical theory through experimental science to practical clinical applications. The purpose of the undergraduate program in biomedical engineering is to permit engineering undergraduate students who plan to dedicate their professional careers to the biomedical area to prepare themselves adequately for graduate work in biomedical engineering, medicine, or biology. This program is flexible and can satisfy the requirements for entrance either to graduate work in engineering, physiology, biology, or to medical school.

In an era when health and environmental quality are receiving increasing concern from government and industry, the need for engineers with a base of knowledge in the life sciences is apparent in research, development, manufacturing, and distribution activities. The presence of strong medical and basic science faculties as well as the extensive library resources have facilitated a rapid growth of this newest division of engineering at Duke. The types of activities included in biomedical engineering within this division may be summarized in a listing of the laboratory programs.

The *Cardio-Respiratory Systems Laboratory* is utilized in instruction and research. In addition to standard biological instrumentation, the laboratory equipment includes a PDP-12 digital computer, a PAR signal averager, and an Electronic Associates analog computer which are used to study the utilization of computer science techniques in acquiring, processing, and modeling biological data.

Research in the *Biomedical Materials Laboratory* is directed toward the problems of developing materials which are suitable for use in biological environments such as the vascular system and in producing materials with selective permeability and other chemical and mechanical properties.

Biomedical Engineering in Pediatric Cardiology is concerned with measuring electrical activity of the heart in animals and humans, and interpreting these measurements in order to increase the basic knowledge of the heart itself. The information so gained is also evaluated in terms of its relation to diagnostic problems in clinical practice. Engineering considerations are involved in acquiring the data originally, interpreting

its fundamental significance, and making use of it in practical clinical situations.

The *Optics and Acoustics Laboratories* are well equipped for research and instruction in the biomedical application of these fundamental areas. Ultrasound instrumentation is available and under development for diagnostic measurement and imaging of biological tissue structures. Optical equipments are available for optical data processing, medical image processing, and holography.

In the *Neural Networks Laboratory*, electrophysiological techniques are used to explore the communication of information between individual nerve cells in prototypical brains. From the results of such studies, basic principles of information processing in neural networks can be elucidated. The facilities of this laboratory, which include optical, mechanical, and electronic equipment used in recording neural activity and computational equipment for data analysis and simulation, are utilized for teaching as well as research.

Program of Study in Biomedical Engineering for the Bachelor of Science in Engineering Degree*

General Requirements

†English.....	1 s.c.	
†Mathematics.....	4 s.c.	
†Natural Science.....	3 s.c.	
†Social Sciences and Humanities.....	4 s.c.	
Engineering and Applied Sciences....	2 s.c.	In materials science, mechanics, or thermal science
	1 s.c.	In electrical science or in dynamic sys- tems
†Digital Computation..	Capability required	

Major Requirements

Mathematics.....	1 s.c.	Mathematics elective beyond Math 74.
Natural Science.....	1 s.c.	Chem 2—General Inorganic Chemistry
	1 s.c.	Chem 61—Physical Chemistry
	2 s.c.	Zoology 11 and 12—Introduction to Living Systems
Social Sciences and Humanities.....	1 s.c.	Social science-humanities elective (in addition to 4 s.c. listed under general requirements).

*For students entering after September 1, 1969. Students who entered prior to September, 1969, should consult their faculty advisers.

†Refer to page 7 for details of these general requirements.

Courses in Major	1 s.c.	BME 161—Biomedical Measurements
	1 s.c.	BME 162—Biological Systems Analysis
	1 s.c.	BME 181—Biomedical Modeling
	1 s.c.	BME 182—Biomedical Transfer Processes
Approved Electives	7 s.c.	Approved electives (including one computer course)
Total Minimum	<u> </u>	
Requirement	32 s.c.	

Subsequent Graduate Study

For further information concerning work leading to the M.S. degree, as well as that leading to the Ph.D. degree, refer to regulations covering graduate degrees and biomedical engineering graduate courses.

Interdisciplinary Undergraduate Programs

This major parallels the majors in biomedical, civil, electrical, and mechanical engineering. It provides for special programs of study in interdisciplinary fields, such as energy conversion, engineering mechanics, materials science, ocean engineering, pollution control, systems and controls, and urban engineering, leading to the B.S.E. degree, which may be arranged with approval of the engineering faculty. Any student, in consultation with his adviser or another faculty member, may propose a unique combination of courses designed to meet his particular career objectives. His proposal should be submitted to the Engineering Faculty Council, through the Dean of Engineering, for approval; it may be submitted as early as the second semester of the freshman year and must be submitted before the beginning of the senior year. The proposal should include the student's reasons for pursuing the suggested program of study, and it must show how the proposed courses satisfy the following requirements:

1. The proposed program of study meets the general requirements for the B.S.E. degree but cannot be accommodated by the approved majors in biomedical, civil, electrical or mechanical engineering.
2. A program of at least eight engineering courses is included to provide depth in the selected interdisciplinary area of study.
3. A program of at least five courses, in addition to the 15 courses listed under general requirements, is included to provide breadth in technical (engineering, natural science, and mathematics) areas.
4. The remaining courses, which are treated as electives, require the approval of the student's adviser.

Each student enrolled in an approved interdisciplinary program will be assigned to an appropriate engineering department for administrative purposes.

Graduate Degrees Offered

Through the Graduate School, the School of Engineering offers work leading to the degree of Master of Science (M.S.) and to the Doctor of Philosophy (Ph.D.) degree with a major in biomedical, civil, electrical, or mechanical engineering.

Master of Science and Doctor of Philosophy Degrees

Students with superior undergraduate, or introductory graduate, preparation in appropriate fields may participate in graduate study programs in engineering leading to the degrees of Master of Science and Doctor of Philosophy. The master's degree requires successful completion of a minimum of 30 units of graduate work: 12 in engineering, 6 in related minor work, 6 in either the major or minor field or a relevant third field, and 6 for a research-based thesis.

A non-thesis option is available for the master's degree only. The doctorate requires, beyond the bachelor's degree, twice as many units of credit in each category as the master's degree. Whereas the master's thesis is expected to show the students ability to conduct individual research, the doctoral dissertation is expected to demonstrate his ability to complete in a superior way a program of independent and original research. Each graduate student participates in seminars which are appropriate to his area of specialization.

Programs of Study in Biomedical Engineering

An interdisciplinary program in biomedical engineering leading to the M.S. and Ph.D. degrees is offered. The purpose of this program is to encourage the optimum combination of engineering and biomedical course work with an interdisciplinary research topic so that the graduates of this program can contribute at the most advanced professional level to the interdisciplinary field of biomedical engineering. The Division of Biomedical Engineering offers graduate work with emphasis placed on advanced study and research in three broad areas: (1) biomedical data acquisition and processing; (2) quantitative biological modeling; and (3) biomedical materials and prostheses. The program offers opportunity for advanced experimental and theoretical work in the particular areas of circulatory and respiratory systems, data processing and presentation, dynamic system evaluation, synthetic plasma volume expanders, environ-

mental effects, membrane transport, interaction of blood with foreign surfaces, neural networks, and quantitative diagnosis.

Students may be accepted for graduate study who have undergraduate majors in any of the following areas: engineering, physics, mathematics, chemistry, or biology. Fundamental to graduate study in biomedical engineering are such areas as organic and physical chemistry, advanced mathematics, physiology, together with advanced engineering and applied physics.

Programs of Study in Civil Engineering

Programs of advanced study, research, and design are available in six major areas: engineering mechanics, structural engineering, soil mechanics and foundation engineering, fluid mechanics and hydraulic engineering, materials science and engineering, and sanitary engineering. The department also participates in interdisciplinary programs of graduate instruction and research such as ocean engineering.

Since the programs in most of these areas are interrelated with those offered in other engineering and science departments at the University, the curriculum offers a high degree of flexibility in individual study programs. Appropriate combinations of the major areas with other areas of study are encouraged. Both science-oriented and engineering-design-oriented activities can be selected to accommodate a wide range of student interests.

The graduate programs, as well as research and design activities, are planned to prepare advanced students for positions of leadership in the civil engineering profession.

A minimum prerequisite to the graduate program in civil engineering is a basic knowledge of mathematics through linear differential equations, materials science, solid mechanics, and fluid mechanics.

Programs of Study in Electrical Engineering

The Department of Electrical Engineering is currently engaged in an extensive program of graduate instruction and research relating to man and his environment. More specifically, this program is concerned with four major technical areas: (1) fields and materials, the mutual interaction of which is exploited in devices and systems; (2) the processing and transmitting of information, as in television, radar, telemetry, measurement, electronics, computation, and control; (3) the processing, transmitting, and controlling of energy, as in solid-state converters, nuclear reactors, rotating machines, power systems, and automatic industrial processes; (4) interdisciplinary activities. Direction and impetus for the program derive both from the interests of students and faculty and from the needs of industry and of government agencies. The production both of significant new knowledge and techniques and of

highly qualified new researchers and practitioners is the goal of the graduate program in electrical engineering at Duke.

A minimum prerequisite to the graduate courses in electrical engineering is a basic knowledge of differential equations, electric and magnetic field theory, and the theory of networks. A previous course in modern physics is recommended.

Programs of Study in Mechanical Engineering

The Department of Mechanical Engineering is engaged in a program of instruction and research directed toward the more effective generation, use, and control of power through the application of scientific and engineering knowledge of materials, mechanics, and energy transfer. At the graduate level emphasis is placed on advanced study, research, and design in three primary areas of thermal and fluid systems, design and control of machines and processes, and development of materials. Included are experimental and theoretical studies of heat and mass transfer, thermodynamics, fluid mechanics, vibrations, dynamics of physical systems and machinery, automatic control, power generation, propulsion, refrigeration and cryogenics, nuclear engineering, machine design, and the structure and forming of materials including metals, polymers, and ceramics.

The department is actively participating in a variety of interdisciplinary activities in cooperation with other segments of the University. In the area of biomedical engineering, the department conducts research in biomechanics, biomaterials, and thermal, fluid, and mass transfer problems in biological systems. There are other interdisciplinary research programs in oceanographic engineering, interaction of fields and materials, and transportation engineering. Involvement with various cooperating departments and schools at Duke University is one of the goals for graduate students involved in these interdisciplinary programs. Increasing emphasis is placed on the development of creative abilities of graduate students, and on relating the research to the needs of an era of exploding population and technical progress.

A minimum prerequisite to the graduate courses in mechanical engineering is a knowledge of solid and fluid mechanics, energy processes, materials science, and advanced engineering mathematics.

Undergraduate Special and Cooperative Programs

Reserve Officers Training Corps

Through the Naval and Air Force Reserve Officers Training programs the University is cooperating with the Department of Defense in providing well-educated officers for the regular and reserve forces of the nation.

The Naval Reserve Officers Training Corps

There are two basic programs through which students can qualify for Naval commissions upon graduation: one, the Regular Naval Reserve Officers Training Corps program, provides a maximum of four years in the University largely at government expense, followed by a commission in the regular Navy or Marine Corps; the other, the Contract Program, leads to a commission in the Naval Reserve or the U. S. Marine Corps Reserve. Additional information may be found in the *Bulletin of Undergraduate Instruction*.

The Air Force Reserve Officers Training Corps

The unit functions as a regular department of instruction known as the Department of Air Force Aerospace Studies. It selects, trains, and

commissions college men who desire to serve in the U. S. Air Force. Additional information may be found in the *Bulletin of Undergraduate Instruction*.

Advanced Placement Program

Course placement is accomplished on the basis of good performance on either the Advanced Placement Examinations of the CEEB or, to a more limited extent, on placement tests given by Duke during Freshman Week and upon certain achievement tests offered by CEEB. The College Board Advanced Placement Examinations are a vehicle to courses on the sophomore level or higher in botany, chemistry, English, French, German, history, Latin, mathematics, physics, Spanish, and zoology, whereas the Duke tests are used to decide such placement only in foreign languages, biological science, and mathematics. A further distinction is that only the AP Examinations may lead to credit toward graduation for the course or courses omitted and waiver of *general requirements*. The departmental directors of undergraduate study and the University Registrar are charged with the responsibility for evaluations leading to advanced placement of freshman matriculants.

Advanced Placement Examinations are given in May by the College Entrance Examination Board. Information regarding the tests may be obtained from the Board.

Study Abroad

Special programs for study abroad are available to Duke students. Some of these are organized by the University and others are available through special cooperative arrangements. In certain cases scholarship aid may be applied to study abroad.

A leave of absence from the University is arranged for students who qualify. When possible, arrangements are made for students to pre-register while abroad for the semester in which they return.

Additional information may be found in the *Bulletin of Undergraduate Instruction*.

Eligibility for Special Curricular Programs

Reading-out of Introductory Courses

The option to "read" in order to by-pass introductory or prerequisite courses is open to students of demonstrated academic ability to allow

them to advance at their own pace to upper-level work. No course credit may be earned by "reading-out." Any student interested in reading during the summer to by-pass an introductory or prerequisite course must be recommended by his dean and secure the permission of the department concerned. Reading for a course and auditing are mutually exclusive procedures. A proposed program of reading should be approved by the director of undergraduate studies in the department in which the work will be done. On passing a qualifying examination prepared by the department a student may be certified for advanced course work in the area. On completion of an advanced course, an entry will be made on his permanent record that he has passed a qualifying examination but no course credit is awarded. Interested students should request further information from the Dean's Office.

Independent Study

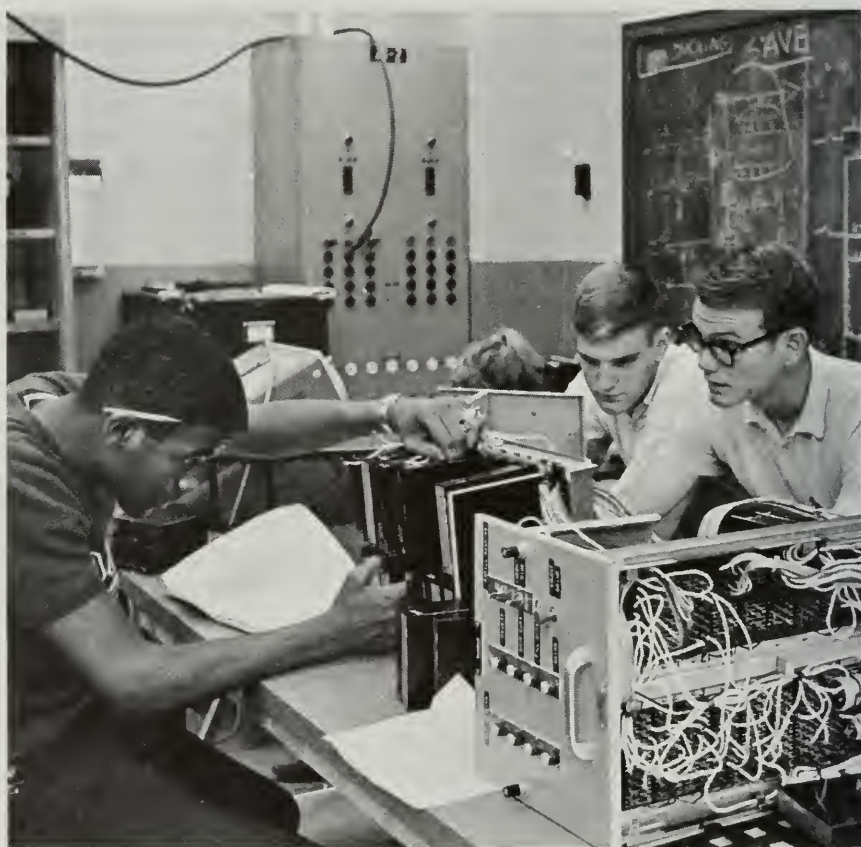
Independent study enables a student to pursue individual research and reading in a field of special interest subject to the supervision of a member of the faculty. A student, with approval of his adviser, the instructor, and the director of undergraduate studies of the instructor's department, may enroll in independent study. Interested students should consult the director of undergraduate studies in the department in which they wish to work.

Graduation With Distinction

Programs featuring independent study and other honors opportunities are available under the title *Graduation with Distinction* in the majority of the academic departments. Although the details and requirements of the program vary from department to department, certain general requirements are uniform. Departments participating may invite students at the end of the sophomore or junior year to enter the Graduation with Distinction Program. To be eligible, students must show promise of achieving by the time of graduation at least a *B* average in the major field. After participation in a seminar in the junior or senior year, and/or a directed course of reading, laboratory research, or other independent study, the student must embody the results of his individual research and study in a distinguished piece of writing. The student's achievement, including the paper, is assessed by a departmental committee. If the student has at least a *B* average in the major field, the committee may recommend that the student be Graduated with Distinction in his major field. Interested students should consult the director of undergraduate studies in his department.

Reciprocal Agreement with the Consolidated University of North Carolina and North Carolina Central University

Under a plan of cooperation between the Consolidated University of North Carolina and Duke University, and between North Carolina Central University and Duke University, students regularly enrolled in the Consolidated University and in North Carolina Central University during the regular academic year, and paying full fees to their institution, may be admitted to two approved courses per semester at Duke University upon payment of a nominal registration fee of two dollars plus any other special fees required of all students. Under the same arrangements, students at Duke University may be admitted to one approved course per semester at the Consolidated University of North Carolina or North Carolina Central University.



Student Life

Living Accommodations

As the undergraduate units of the University are resident institutions, students are required to live in the residence halls. Any exceptions must be approved by the Dean of Men or the Dean of Women. Rooms are not rented for a shorter period than one semester. No refund of room rent will be made except for involuntary withdrawal to enter the armed services. Such refunds are made in accordance with the University's established schedule. (See the chapter on Financial Information for living expenses.)

Housing

Undergraduate Men. Upon their admission to the School of Engineering, men students are sent detailed information by the Dean of Undergraduate Men concerning their obligations under the housing contract. Certain houses are reserved for members of the freshman classes. Each of these units has a resident head housemaster and one or more housemasters. A limited number of freshmen reside in other houses where they live in community with upperclass students and a fellow, a faculty member or an advanced graduate student who serves as their adviser.

Undergraduate Women. Women students enrolled in engineering live in the residence houses of The Woman's College. (A section of the Graduate Center, West Campus, is also reserved for undergraduate women.)

These houses are alike in their organization. In each of them there is a resident house counselor, who is a member of the Dean's staff, and full representation from all four classes, with the appropriate number of places reserved each year for freshmen.

Graduate Students. Duke University strives to provide comfortable, attractive living accommodations for graduate-level resident students, both married and unmarried.

The Graduate Center houses 197 male graduate students, 56 women graduate students, and 117 women undergraduates. Commons facilities on the main floor are shared by men and women.

Room reservations are made through the Office of Housing Management only after official acceptance for admission to the University.

Rooms in residence halls are normally rented for the academic year, but for no period less than one semester or specific term.

Detailed information about University housing facilities for single and married students, including rental rates, will be provided upon request by the Department of Housing Management, Duke University, Duke Station, Durham, N.C. 27706.

Dining Facilities

The dining facilities on the West Campus include two cafeterias, with multiple-choice menus, and the Oak Room where full meals and *a la carte* items are served. The dining halls in which all resident women have their meals are located in the Woman's College Union and in Gilbert-Addoms residence hall. Because of the large number served in the dining halls, it is not possible to arrange special diets for individual students. The Graduate Center has a cafeteria and a coffee lounge.

Services Available

Medical Care

The complete medical facilities of the Duke University Medical Center are available to all members of the University community. Care is provided for men at the Student Health Office in Duke Hospital and for women at the Woman's College Infirmary.

For information about the Student Health program and the services provided, see the *Bulletin of Undergraduate Instruction* or the *Graduate School Bulletin*.

The Counseling Center

The University maintains a counseling center which provides educational, vocational, and personal counseling for students. The Center is the

administrative agency for most of the national testing programs, including admissions tests for graduate and professional schools. A library of information on occupations, graduate training, and fellowships for graduate study is maintained.

The counseling and information services of the Center are free to Duke students. Additional information on the counseling, testing, and information services may be secured from the Duke University Counseling Center, 309 Flowers Building, Duke University, Durham, North Carolina, 27706.

Office of Placement Services

Duke University maintains an Office of Placement Services which acts as a liaison between the University and potential employers in business, education, and government. All services are offered without charge to Duke students and alumni. The staff is available to talk with students about their future professional plans. Students who wish to register with the office are offered an opportunity to assemble a complete dossier of academic records and recommendations to supplement applications for positions and to have a permanent file for future reference. Pertinent recommendations are far easier to accumulate during the time a student is enrolled at Duke. Interviews with representatives visiting Duke are scheduled throughout the year through the Office of Placement Services for those students who have registered. Copies of academic records are released only with the permission of the individual.

Organizations and Activities

Student Activities

Engineering students are welcome to use such recreational facilities as swimming pools, tennis courts, golf course, and to affiliate with choral, instrumental, drama, and religious groups.

Engineers' Student Government

The Engineers' Student Government, composed of members from the various organizations and classes in the engineering student body, coordinates the activities of student organizations in the School. It acts to represent the interests of the students in their relationships with the public, the faculty, and the administration. The ESG is responsible for such activities as the Engineers homecoming displays, supervision of the student lounge, social events, and the Engineers Guidance Council.

Engineering Student Publication

The *DukEngineer*, official student-published magazine of the School, which appears twice each semester, contains articles on technical and semi-technical topics and other matters of interest in the School.

General Activities Open to Engineers

As part of the University community, students in the engineering programs share in all activities open to students.

Student Branches of Engineering Professional Societies

The departments of the School support student branches of the following national professional engineering societies: American Society of Civil Engineers, American Society of Mechanical Engineers, Institute of Electrical and Electronics Engineers.

Engineering Guest Speaker Program

In addition to his participation in the student branches of the national professional engineering societies, the student has the opportunity of additional development through the Engineering Guest Speaker Program. The general function of the series is to provide stimulating lectures by outstanding members of the engineering profession.

The James L. Meriam Guest Speaker Series was established in 1969 by the Engineers' Student Government to recognize Dean Meriam's belief in the valuable contribution of selected guest speakers to the School of Engineering, the University community, and professional engineers in the area and his initiative and devotion to the guest speaker program. The Student Government provides annually the support for a guest speaker of high calibre who is designated "James L. Meriam Guest Speaker."

Engineering Honor Societies

Tau Beta Pi. Engineering national honor society—Gamma Chapter of North Carolina.

Chi Epsilon. Civil engineering national honor society—Duke University Chapter.

Eta Kappa Nu. Electrical engineering national honor society—Delta Lambda Chapter.

Pi Tau Sigma. Mechanical engineering national honor society—Pi Iota Chapter.

Order of St. Patrick. Honor society recognizing leadership in engineering student activities.

General Honor Societies

In addition to the national engineering student honor societies, students of the School are eligible for membership in the other national and local honor societies throughout the campus.

Engineering Awards and Prizes

The Tau Beta Pi Prize is awarded each year by North Carolina Gamma Chapter of Tau Beta Pi, engineering national honor society, to a sophomore student in engineering for outstanding scholastic achievement during the freshman year.

The Walter J. Seeley Scholastic Award is presented annually by the Engineers' Student Government to that member of the graduating class of the School who has achieved the highest scholastic average in all subjects, and who has shown diligence in pursuit of an engineering education. The award was initiated to honor Dean Emeritus Walter J. Seeley. The name of the recipient is inscribed on a plaque displayed in the Engineering Building.

The Hamilton Watch Award is presented by the Hamilton Watch Company to the senior in engineering who has most successfully combined proficiency in his major field of study with notable achievements in the social sciences and humanities. The award is a Hamilton electric watch, appropriately engraved, accompanied by a letter of commendation to the recipient.

The American Society of Civil Engineers Prize is awarded annually by the North Carolina Chapter of the American Society of Civil Engineers to two outstanding seniors in civil engineering, upon recommendation of the faculty of the Civil Engineering Department. The basis for selection is the student's scholastic record, his contribution to the student chapter, and his participation in other college activities and organizations. The prize consists of a Certificate of Award and the payment of one year's dues in the American Society of Civil Engineers.

The American Public Works Association Prize is awarded annually by the North Carolina Section to an outstanding senior in Civil Engineering upon the recommendation of the faculty of the Civil Engineering Department. The basis for selection is the student's scholastic record and his interest in a career in public works. The Prize consists of a Certificate of Award, one year's payment of dues in the American Public Works Association, and a \$25 cash award.

The George Sherrerd III Memorial Award in Electrical Engineering is awarded annually to that senior student in electrical engineering who, in the opinion of the electrical engineering faculty, has attained the highest level of scholastic achievement in all subjects and simultaneously

has rendered significant service to the School of Engineering and the University at large. The Award was established in 1958 by the parents of George Sherrerd, III, a graduate of the Class of 1955, to recognize outstanding undergraduate scholarship. The recipient receives a monetary award and his name is inscribed on a plaque displayed in the Engineering Building.

The Charles Ernest Seager Memorial Award recognizes outstanding achievement in the annual Student Prize Paper Contest of the Duke Branch of the Institute of Electrical and Electronics Engineers. The Award, established in 1958 by the widow and friends of Charles Ernest Seager, a graduate of the Class of 1955, consists of inscribing the name of the contest winner on a plaque displayed in the Engineering Building.

The Milmow Prize is awarded annually to the student from North or South Carolina graduating in the Department of Electrical Engineering who, in the opinion of the faculty of that department and, as shown by his grades, has made the most progress in electrical engineering during his last year in School. The prize consists of a Certificate of Award and one year's payment of dues in the Institute of Electrical and Electronics Engineers for the membership year in which the honoree is awarded his baccalaureate degree.

The American Society of Mechanical Engineers Award is presented annually to a senior in mechanical engineering for his outstanding efforts and accomplishments in behalf of the American Society of Mechanical Engineers Student Section at Duke. The Award consists of a Certificate of Recognition.

The T. C. Heyward Award is given annually to the outstanding Mechanical Engineering Sophomore by Pi Tau Sigma. The Award will normally consist of a handbook as well as a small cash award.

The Machinery Magazine Award is presented annually by The Industrial Press, publisher of the magazine, to the outstanding student in machine design in the graduating class. The Award consists of a copy of the latest edition of *Machinery's Handbook*.

Admission

Undergraduate Admission

New students are admitted to the School of Engineering in September of each year. The size of the Freshman Class is set at approximately 150 students.

Because enrollment is limited, the Committee on Admissions selects those students who in its judgment are best qualified to benefit from the opportunities which the School offers. Selection is based not only upon grades and test scores but also upon recommendations of school officials and other personal criteria. Applicants will be considered without regard to race, religion, creed, sex, or national origin.

Requirements

Although there are no inflexible subject matter requirements, at least 15 acceptable units of secondary school credit must be presented. Of these at least 12 must be in college preparatory subjects: English, foreign language, history and social studies, mathematics, and physical or biological sciences. Applicants for the School of Engineering are advised to present four units of mathematics and at least one unit in physics or chemistry.

Students applying for admission are required to take the Scholastic Aptitude Test, the English Composition Test, the appropriate mathe-

matics test, and one other achievement test of their own choosing given by the College Entrance Examination Board.

Prospective students are urged to broaden their reading outside of class during their senior year and to make the acquaintance of books and magazines that do not form part of the subject matter of their courses. At the same time, they should take every opportunity to increase their competence in writing. Those who cannot write simple, clear, grammatical English prose will be at a serious disadvantage in the competition for admission and also in the general work of the freshman year.

Early Decision Plan

For the well-qualified student who has definitely decided to enter Duke if accepted, the University offers to reserve a place by Early Decision on December 1 of the student's senior year in secondary school. The deadline date for completing applications for Early Decision is November 1; therefore, prospective Early Decision candidates should make arrangements to take the Scholastic Aptitude Test and three achievement tests, including English composition, on or before the July testing date preceding their senior year.

Regular Admission

Candidates for regular admission must apply no later than February 1, and normally do so during the fall of the senior year. For this group, decisions are mailed by April 15.

Application forms and instructions will be sent, upon request, by the Office of Admissions, Duke University, Durham, North Carolina 27706. A non-refundable processing fee of \$15.00 must accompany the application form.

The University does not require interviews for admission. However, a candidate who wishes to arrange an interview should do so through the Director of Undergraduate Admissions.

Admission to Advanced Standing

Admission by transfer from other institutions may be arranged for a number of students entering the rising sophomore or junior class of Duke University. All such candidates must submit, in addition to the normal application materials, official transcripts of all work completed at other accredited colleges, employment record when candidates have been employed for an extended period since graduation from secondary school, and scores on the Scholastic Aptitude Test of the College Entrance Examination Board. Courses on which a grade less than C has been earned cannot be accepted for transfer credit.

A small number of special students of mature age may be admitted for

such courses of instruction as their earlier training and experience may qualify them to take. They may not be accepted as candidates for a degree, however, unless they meet all normal requirements for admission.

Readmission of Former Students

A student who desires to return, following withdrawal from the University, should apply to the Director of Undergraduate Admissions. He will be asked to send a detailed statement of his activities since withdrawal. If practicable, the student should arrange for an interview with the Dean.

Graduate Admission

Prerequisites

A student seeking admission to the Graduate School of Duke University with a major in engineering must have received a bachelor's degree from an accredited institution. His undergraduate program should be well rounded and of such quality as to give positive evidence of capacity for graduate study. Normally he should have majored in the area of his intended graduate study. The departments of the School of Engineering list specific prerequisites in the section of this *Bulletin* entitled Graduate Degrees Offered.

Students Requiring Admission

Admission is required of (1) all students who intend to pursue study toward a degree offered by the Graduate School, (2) all other students who desire credit for whatever purpose for graduate courses—except students who register as special students in the Summer Session. Students who have discontinued a program of study after earning a master's degree here must by letter request permission of the Dean of the Graduate School to undertake a doctoral program. Members of the Duke University faculty will be granted only non-degree admission.

Procedure for all Applicants

A student seeking admission to the Graduate School should request the Dean of the Graduate School to send an application blank. This he should fill out completely and return promptly. In addition he should provide the following supporting documents: (1) a transcript or transcripts of all his undergraduate and graduate work mailed directly by the Registrar to the Dean; (2) as soon as possible, supplementary transcripts showing completion of work in progress when the earlier transcript was made; (3) three letters of recommendation written by persons best qualified to judge him as a prospective graduate student and mailed directly to the

Dean. Scores on the Graduate Record Examination are recommended for all applicants.

All applicants except foreign students applying from outside the United States and non-degree students must include an application fee of \$10.00 in check or money order payable to Duke University.

Additional Procedure for Foreign Students

Fully qualified students from outside the United States are welcomed in the Graduate School to take courses and in many instances to study toward a degree. In applying for admission the foreign student should, in addition to the information required of all students, submit with his application (1) if his native language is not English, certification of ability to use English through scores on tests provided by the Educational Testing Service (TOEFL), the University of Michigan Language Institute, or the American University Language Center, (2) a statement certified by a responsible person that his finances are sufficient to maintain him during his stay at Duke University, and (3) a statement by a qualified medical doctor describing any emotional or physical illness the applicant has had during the previous five years.

All foreign students whose native language is not English will be examined during their first registration period for competence in the use of oral and written English. Until competence is determined, admission and arrangements for an award involving teaching must remain provisional.

Closing Dates for Applications

Because applications cannot be reviewed until all required supporting documents are filed, applications for admission to the Graduate School should be submitted at least *two weeks* before the closing dates listed below:

Fall semester, admission and award	February 15
Fall semester, admission only	August 1
Spring semester, admission only	January 1
Summer Session,* First Term	May 12
Summer Session,* Second Term	June 20

Notification of Admission

When admission to the Graduate School is approved, the student will receive a letter of admission and an acceptance form. The process of admission is not complete until the statement of acceptance has been returned. For a more complete discussion of admission status, refer to the *Bulletin of the Graduate School*.

*Students seeking admission to the Summer Session should make application to the Dean of the Graduate School as well as to the Director of the Summer Session.

Financial Information

Undergraduate Tuition, Fees, and Other Expenses

Tuition and fees paid by the students cover only a part of the cost of their instruction and of the operations of the University. Income from endowment and contributions from the alumni, alumnae, and other public-spirited men and women meet the balance, which constitutes almost two-thirds of the total cost.

Estimated Expenses for an Academic Year. Certain basic expenditures are to be considered in preparing a student's budget, such as tuition, room, and board. These necessary expenditures together with a reasonable amount allotted for miscellaneous items such as books and supplies are shown below:

	<i>Men</i>	<i>Women</i>
Tuition	\$2,100.00	\$2,100.00
Room Rent (Double Room)	335.00	360.00
Board	*650.00	†550.00
Books and Supplies	150.00	150.00

It should be realized that additional expenses will be incurred which will depend to a large extent upon the tastes and habits of the individual. It is realistic to suggest that the average Duke student, however, can plan

*Cafeteria estimate.

†Board rate.

on a budget of approximately \$3,700.00 for the academic year. Travel costs, clothing purchases, and other major expenditures would have to be added to this estimate.

Debts. No records are released and no student is considered by the faculty as a candidate for graduation until he has settled with the Bursar for all indebtedness.

Bills may be sent to parents or guardians provided the Bursar has been requested in writing to do so. Failure to pay bills on or before the due dates will debar the student from class attendance until the account is settled in full.

Tuition. Tuition of \$1,050.00 is due and payable not later than the day of registration for a particular semester. After the day of registration refund of the tuition on a pro-rata basis will be made only in the event the student involuntarily withdraws to enter the armed services or dies during the course of the semester.

Registration Fees and Deposit. New students, on notification of acceptance, are required to pay a non-refundable first registration fee of \$20.00 and to make a deposit of \$50.00. The deposit will not be refunded to accepted applicants who fail to matriculate. For those who do matriculate, \$25.00 of the deposit serves as a continuing room deposit for successive semesters, and the remaining \$25.00 serves as a continuing registration deposit. Arrangements for refund of the \$25.00 room deposit are described in information furnished each resident student by the Office of Housing Management.

Readmission. Students who have been readmitted to the University after an absence of one or more semesters, on notification of readmission, are required to make the \$50.00 room and registration deposit.

Late Registration. Students who register in either semester at a date later than that prescribed in the Calendar of the School must pay to the Bursar a fee of \$10.00.

Refunds. The \$25.00 preregistration deposit will be refunded to students (1) who the University does not permit to return, (2) who graduate, or (3) who request the refund at the time of preregistration, thus indicating their intention not to return for the following semester. The preregistration deposit will not be refunded to students who preregister and fail to enter the following semester on schedule.

ROTC Deposit. An Air Force ROTC deposit of \$20.00 is required of students enrolling in Air Science to cover possible loss of military equipment issued to them. This deposit is refunded to the student upon return of issued equipment.

Special Students. In the regular academic year students who register for no more than two courses in a semester are classified as special students. Special students will be charged at the following rates: One course, \$210.00; half-course, \$105.00; quarter-course, \$52.50; one course

plus laboratory or precept, \$280.00. Registration for more than two courses requires payment of full tuition.

Auditors. Auditing of one or more courses without charge is allowed students paying full fees, provided that the consent of the instructor is obtained. Students who are enrolled for not less than one nor more than two courses may audit other courses by payment of \$35.00 for each course audited. With the consent of the appropriate instructor and the Registrar, alumni may audit undergraduate courses for \$35.00 for each course.

Duke Employees. Certain full-time employees with two or more years of service with the University may request permission to take up to two courses during any one semester. Permission may be granted based on the individual merits and circumstances of each application. Employees receiving permission to take such courses will be charged one-half of the tuition rate for special students as shown above. A course may not be audited unless another course is taken for credit.

Fees for Transcripts. Requests for transcripts should be directed to the Office of the Registrar. Ten days should be allowed for processing. A minimum fee of \$1.00, payable in advance, is charged for a single copy. A charge of \$.50 will be made for each additional copy on the same order.

Fees for Course Changes. Changes in courses for reasons not arising within the University require a payment of \$1.00 for each change made. No course may be elected later than one week after the opening of the semester, and no student may be admitted to any class without an official enrollment.

Living Expenses

Housing. In the residence houses for undergraduate men, the rental charge for a single room is \$445.00 for the academic year or \$222.50 for each semester; for a double room the charge is \$335.00 for each occupant, or \$167.50 per semester for each occupant. Rental rates in the air-conditioned dormitories are \$500.00 for a single room for the academic year, or \$250.00 for each semester; for a double room the charge is \$375.00 for each occupant, or \$187.50 per semester for each occupant. Information concerning the student's obligations under the housing contract is published in the *Bulletin of Information and Regulations*.

In the residential units of The Woman's College the rental charge for a single room is \$480.00 for the academic year, or \$240.00 for each semester. The rental charge for a double room is \$360.00 for each occupant, or \$180.00 per semester for each occupant. Detailed information concerning the student's obligations under the housing contract is published in the *Woman's College Handbook*.

Food Services. The dining facilities on the West Campus include two cafeterias, with multiple-choice menus, and the Oak Room where full

meals and *a la carte* items are served. The cost for the academic year will approximate \$650.00 but will vary from this amount depending upon the individual.

The dining halls in which all resident women have their meals are located in the Woman's College Union and in Gilbert-Addoms residence hall. The charge for board is \$275.00 per semester, payable at the time of registration.

Graduate Fees and Expenses

The following table shows the tuition and fees collected from all students. All charges for each semester are due and payable, unless otherwise specified, at the time of registration for that semester and are subject to change without notice. No student is admitted to classes until arrangements have been made with the Bursar of the University for the settlement of his tuition and fees.

Tuition (\$63.00 per unit).....	\$945.00
Athletic fee, optional, per year, not including federal tax, payable in the fall semester.....	25.00
Binding fee, three copies of thesis or dissertation, other copies optional, \$5.00 a copy.....	15.00
<i>In absentia</i> fee, due on date of registration, one unit per semester.....	63.00
Late registration fee.....	10.00
Microfilming fee, doctoral degree only, upon final submission of dissertation.....	25.00

Tuition for a full semester program of 15 units amounts to \$945.00. Part-time tuition is computed at the rate of \$63.00 per unit.

Undergraduate Financial Aid

It is the aim of the Financial Aid Program to provide, insofar as possible, financial assistance required by students who are unable to defray the cost of college from their own resources. This assistance is made available in the form of scholarships, grants-in-aid, loans, and part-time employment.

All requests for application materials for scholarships and other forms of financial assistance should be addressed to the Office of Undergraduate Admissions, Duke University, Durham, North Carolina 27706.

A student in residence who is receiving financial assistance based upon need may not, without special permission for an appropriate reason,

register an automobile on campus during the academic year for which the aid is granted.

Scholarships

Undergraduate requests for application forms for scholarships, grants-in-aid, industry scholarships, or remission of tuition should be addressed to the Office of Undergraduate Admissions, Duke University, Durham, North Carolina 27706.

All candidates for scholarships and grants-in-aid must submit an official Application for Admission to the University and the Application for Scholarship to the Office of Admissions. Scholarship candidates who desire to be considered for the maximum value of scholarships on the basis of financial circumstances are required to submit the "Parents' Confidential Statement" of the College Scholarship Service, which may be obtained from high school principals, guidance office, or from the Duke Admissions Office.

Scholarship candidates should initiate their applications during the fall semester of their senior year of study in secondary schools. Instructions concerning the specific requirements and deadline dates will accompany the application materials sent to applicants for scholarships and grants-in-aid.

Awards annually available to all undergraduate students at Duke University are listed in the *Bulletin of Undergraduate Instruction*.

Engineering Scholarships. The following scholarships are available to engineering students: Engineering Scholarship Fund, Jones Scholarship Fund, Alcoa Scholarships in Engineering, Western Electric Fund Scholarship, Union Camp Corporation Scholarship, and Collier Cobb Associates Scholarship.

Duke University participates in several other industry scholarship programs. Several of these awards for which freshmen may apply are assigned to engineering students annually although they are not restricted to students in this field of study.

For more information on these scholarships, see the *Bulletin of Undergraduate Instruction*.

Loans

Loan funds held in trust by the University as well as funds supplied by the federal government through the National Defense Education Act of 1958 are available to qualified students. Freshmen as well as upperclassmen are eligible to apply for a student loan. Loan applications must be submitted not later than July 1 preceding the academic year for which assistance is requested.

For details concerning loans, see the *Bulletin of Undergraduate Instruction*.

Employment Opportunities

The Financial Aid Office maintains an employment office to serve students who need part-time jobs. There are many opportunities both on the campus and in the city of Durham. A considerable number of students each year help defray their college expenses by working.

Those students accepted for admission to the School of Engineering in need of part-time employment should apply to Financial Aid Office, Duke University, Durham, North Carolina 27706. Women students who need and qualify for part-time campus employment should apply to the Assistant Dean of Undergraduate Women, 111 East Duke Building, Duke University, Durham, North Carolina 27708.

Graduate Financial Aid

Awards through the Graduate School

For the encouragement and financial assistance of graduate students of marked ability, Duke University has established a considerable number of fellowships, scholarships, and assistantships. The stipends for these range up to \$4,500 for the academic year. Holders of grants pay tuition and other fees regularly required of all graduate students.

Fellows and scholars pay full tuition and fees and are expected to register for a full schedule of course work each semester. In general, assistants register for a four-fifths program and pay 12 units tuition and fees per semester.

Application for these awards, along with all supporting documents, must be submitted on or before February 15. Notification may normally be expected by late March. Late applications will be considered should any vacancies occur in the list of appointees. No appointment is made for longer than one academic year.

Further information and application forms may be obtained from the Dean of the Graduate School, Duke University, Durham, North Carolina 27706.

Awards through the School of Engineering

The School of Engineering and its component departments are able to offer appointments as teaching and research assistants to graduate students in engineering. Stipends range up to \$3,744 for the academic year.

Further information concerning these appointments and procedures for making application may be obtained from the Chairman of the Graduate Studies Committee, School of Engineering, Duke University, Durham, N. C. 27706.

University Registration and Regulations

Undergraduate Registration

Preregistration

Each new student receives a copy of the *Academic Guide for Freshmen* and the *Bulletin of the School of Engineering* in the summer and submits a trial course program for his first semester. He completes his final registration during Freshman Week. All other students preregister for a given semester in the previous fall or spring of the year (see University Calendar, on p. v) on the basis of information and advising available to them. Students who preregister in either semester at a date later than that specified in the calendar of the colleges are subject to a penalty of \$10.00, payable to the Bursar. Students who do not preregister within an allotted time must be readmitted to the school by application to the Director of Admissions.

Semester Opening and Registration

Each preregistered undergraduate student is required to return to the University each semester on registration day and to report to his college office by 6 p.m. Ample time should be allowed since failure to report

entails loss of the continuing registration deposit of \$25.00 and of registration in each class for which one is preregistered. An official enrollment is required for admission to any class.

After preregistration, course changes may be made on Registration Day or during the first week of classes. Changes in courses for reasons not arising within the University entail a fee of \$1.00 per change.

Undergraduate Academic Regulations

Course Requirements

The normal course load each semester is four semester-courses. To take more than five semester-courses, or fewer than four, in any semester, a student must have the approval of the Dean. No student may take more than six courses in any semester.

Ordinarily, a senior may not elect for credit toward graduation any courses open primarily to freshmen. Juniors may elect only one such course. The Graduate School rules provide that juniors may enroll in a 200-level course if they have earned an over-all *B* average and have obtained the written consent of the instructor, as well as that of the director of graduate studies in the department concerned.

Course Audit. With the written consent of the instructor, a full-time, degree student is allowed to audit one or more courses in addition to the normal program. With the consent of the appropriate instructor and the Registrar, alumni may audit undergraduate courses at the usual auditing fee. After the first week of classes in any semester, no student classified as an auditor in a particular course may take the course for credit, and no student taking a particular course for credit may change classification to an auditor. A student may not repeat for credit any course he has previously audited. Auditors submit no daily work, take no examinations, and receive no credit for courses.

Course Changes. During the week following Registration Day, courses may be dropped and added provided certain procedures are followed. A course is not officially dropped or added until the Central Records Office receives the appropriate card signed by the Dean.

After the first week of classes, courses may not be added; nor may courses be dropped without penalty except for special reasons approved by the Dean. A student may drop a course without penalty in the early weeks of the semester if he is clearly carrying a course overload. For freshmen this period extends to the time when six-weeks' grades are assigned; for upperclassmen it extends to November 1 in the fall semester and March 1 in the spring semester. Factors such as poor health or necessary outside work are also taken into consideration in assessing permis-

sible withdrawal from courses without penalty. After the above dates, withdrawal will ordinarily incur a penalty *F*. A course discontinued at any time without approval will be assigned an *F*.

Attendance Regulations

Responsibility for class attendance rests with the individual student. *He is expected to attend classes regularly and punctually.* A student should recognize that one of the most vital aspects of a residential college experience is attendance in the classroom.

The members of the student body are considered sufficiently mature to appreciate the necessity of regular attendance, to accept this personal responsibility, and to demonstrate the kind of self-discipline essential for such performance and, conversely, to recognize and accept the consequences of failure to attend. An instructor is privileged to refer to the Dean for suitable action students who in his opinion are causing their work or that of the class to suffer because of absences or latenesses. When excessive absences result in a student's failure to carry a normal course load, the Dean, following consultation with the student, will determine whether or not the student may continue his enrollment in the University.

Absences from tests and required classes due to illness will be excused when certified by a proper medical official. Absences due to authorized representation of the University may be excused. Officials in charge of groups representing the University are required to submit names of those persons to be excused to the Dean's office 48 hours in advance of the hour when their absences are to commence.

Leave of Absence

An upperclassman in good standing may apply in writing to the Dean for approval to take a leave of absence. If granted, the leave will begin at the end of the semester in which application is made and will last for one or two semesters. While on leave a student must inform the Dean before November 1 (for a fall leave) or April 1 (for a spring leave) of his intention to return for the next semester. A student failing to meet the deadline will be considered to have withdrawn from the University and will have to apply for readmission. Ordinarily, no leaves are approved for residence in the Durham area.

Withdrawal and Readmission

A student who wishes to withdraw from the University must give official notification to his Dean. Withdrawals at student initiative prior to the Christmas recess in the fall term or prior to April 15 in the spring term are coded as voluntary, and a *W* is entered in lieu of a grade for

each course. Voluntary withdrawals after these dates are permitted only in the event of emergencies beyond the control of the student.

Applications for readmission are made to the Undergraduate Admissions Office.

Applications for readmission must be submitted by December 1 for admission in February, and by August 1 for admission in September.

Regulations for Participation in Athletics and Other Activities

Members of the athletic teams or other student groups engaging in public representation of the University are expected to be carrying their current work satisfactorily. Students may be barred from participation in such representation if, in the opinion of the Dean, they fail to meet this requirement.

Grading

Final grades on performance in academic work are sent to students and parents, or guardians, after the examinations at the end of each semester. In addition, six-weeks advisory grade reports for freshmen are mailed each semester. Grade symbols are as follows:

Passing. A, exceptional; B, superior; and C, average; D, low pass. A passing grade may be modified by a plus (+) or a minus (—).

Failing. A grade of F indicates that the student has failed the course and that to receive credit for the course he must register for the course and repeat the work in class.

Pass-Fail Option for Elective Courses. With the consent of the instructor, a junior or senior student may choose to be graded on a pass-fail basis in one non-major elective course each semester. A student accepted on this basis completes all the work of the course but receives either a pass (P) or fail (F) grade in lieu of a standard grade. A pass grade may not subsequently be converted to a regular letter grade nor may the course be retaken on a regular credit basis. After the first week of classes in any semester, no student classified as pass-fail in a particular course may change to regular registration and no student in regular registration may change classification to pass-fail.

Absence from the final examination. In all cases in which the student is absent from a final examination he receives an X instead of a final grade. If he does not present an acceptable explanation for his absence to the Dean's office within 48 hours after the scheduled time for the examination, the X is converted to an F. If the absence is excused by the Dean, the student arranges with the Dean and the instructor for a make-up examination. An X not cleared by the end of the semester following the examination missed is converted to an F.

Incomplete work. If because of illness or other emergency a student's work in a course is incomplete, he may receive an I for the course instead

of a final grade. Incomplete courses must be completed before the close of the succeeding semester; otherwise, the *I* is converted to an *F* and the course must be retaken if the student is to receive credit for it. In case a student whose work is incomplete is also absent from the final examination, he receives an *X* for the course. Seniors are expected to complete all courses before graduation.

For purposes of satisfying continuation requirements (see pages 50-51), an *I* is counted as a failing grade. If a student desires to satisfy continuation requirements by completing a course in which he has received an *I*, he must complete the course in time for a final grade to be submitted to the Registrar no later than the day preceding Registration Day for the spring semester or for the first term of the summer session. In the case of an *I* received in the spring semester, this requirement applies whether or not the student plans to attend summer school.

Withdrawal. The letter *W* is used to indicate official withdrawal from a course. If a student drops a course without such permission, a grade of *F* is recorded for that course. If he drops with permission a course in which he is failing, the grade for that course is recorded as an *F* unless in the judgment of the Dean circumstances do not require this penalty but permit a notation of a *W* to indicate official withdrawal.

Credits

The unit of credit for academic work undertaken in the colleges is the semester course, which generally consists of three to four hours of instruction time each week of the semester. Half-courses and double-courses are also recognized.

Seniors who at the beginning of a semester lack no more than three semester courses for the fulfillment of the requirements for the B.S.E. degree may enroll, with permission of the Dean of the Graduate School, in graduate courses for a maximum total program of 15 units or equivalent.

Advanced Placement Course Credit. Any student who has earned a score of three or higher on an Advanced Placement examination of the CEEB and is approved for placement in a sophomore-level course or above may be considered for course credit in appropriate subjects. For those presenting scores of four or five the award of credit will be made automatically upon matriculation; for those presenting scores of three it will be determined with the approval of the University department concerned no earlier than at the end of the first semester. Course credit may be granted for one or two semesters in each subject area in which examination is offered in the Advanced Placement Program. For more detailed information, see the *Bulletin of Undergraduate Instruction*.

Excuse From Required Course in English Composition. Students who present a score of 700 or higher on the CEEB English Composition

Achievement Test are excused from the required course in English composition, English 1. They thereby satisfy the English composition proficiency requirement for graduation, but do not receive credit for English 1.

Duke University Placement Tests. Placement tests in foreign languages and mathematics are administered by Duke University. The foreign language tests are offered during Freshman Week and also at the end of each semester for students desiring to demonstrate proficiency at the level required for graduation.

The mathematics placement test is available as needed to establish whether or not a student is qualified to take the beginning course in mathematics, namely Mathematics 31. Freshmen who believe that they are eligible for placement beyond Mathematics 31 are invited to see the supervisor of freshman instruction in that department early in Freshman Week. Placement beyond Mathematics 31 does not provide credit for that course.

Transfer Credit. Transfer credit is evaluated from regionally accredited, degree-granting institutions. Courses taken away from Duke in which grades of less than C have been earned are not acceptable for transfer credit. Credit for work completed at other institutions will be determined in relation to the curricular requirements of the School of Engineering at Duke.

Credit for courses in science, mathematics, or foreign language offered for advanced standing in any of the undergraduate colleges by a transfer student from a junior college will be evaluated by the departments concerned.

Students who transfer to Duke may receive credit for a maximum of two years of work at other institutions of approved standing. No credit is given for work completed by correspondence, and credit for no more than two semester-courses is allowed for extension courses.

Residence Requirements. The final four semesters—or equivalent—of work must be earned in residence except in those instances in which a student has been approved to take his junior year abroad or been granted a leave of absence.

Continuation Requirements

A student must achieve a satisfactory record of academic performance each semester to continue his enrollment in the University.

A student who fails three or more courses in the first semester of the freshman year or who fails two or more courses in any subsequent semester must leave the University for at least two semesters. (The double summer session may be counted as a semester.) The student's return must be approved by the Dean. If the student thereafter fails two or more courses in a semester he will be permanently dismissed from the Univer-

sity. In addition, a student may be dismissed temporarily or permanently by the Dean for failing to make satisfactory progress toward graduation. In such circumstances, the student may be required to leave the University, either temporarily in order to remedy the conditions that explain his poor performance, or permanently when such action appears in the best interest of both the student and the University. A student who is twice withdrawn in these circumstances may not be readmitted to the University. The term *satisfactory progress* shall be defined by the following schedule showing the minimum number of accumulated passing grades and the minimum number of accumulated grades of C— or better which shall constitute satisfactory progress as a function of the number of academic years completed.

<i>Academic years completed</i>	<i>Minimum number of semester courses passed</i>	<i>Minimum number of semester courses passed with C— or better</i>
1	5	3
2	11	7
3	18	11
4	25	15

Students in the classes of 1970, 1971, and 1972 must pass each semester at least three semester courses or their equivalent in terms of double-courses and half-courses to continue their enrollment.

Grade Requirements for Graduation. For students entering after September 1, 1969, of the 32 semester courses required for graduation, 22 or their equivalent in terms of double-courses and half-courses must be passed with grades of C— or better.

Students in the classes of 1970, 1971, or 1972, including transfer or former students readmitted to Duke, must earn at least a C— average on the combined total of semester hours and semester courses *undertaken* as an undergraduate student; and the academic work of their senior year must average at least a C.

Credit Requirements for Students Entering Before September, 1969

The permanent academic records of students in the classes of 1970, 1971, and 1972, including transfer students and former Duke students readmitted to the colleges, will reflect (a) courses taken before September, 1969, expressed in terms of semester-hours, together with letter grades, quality points, and quality-point ratios; and (b) courses taken after September, 1969, expressed in terms of semester courses, double-courses, and half-courses, together with letter grades earned for each.

Because of the changes explained above, students in the classes of 1970, 1971, and 1972 are required to complete for graduation a combina-

tion of semester-hours and semester-courses (or their equivalent in terms of double-courses and half-courses) according to the following table:

Those who by September 1, 1969, have received credit exclusive of required hours in Physical Education for

Must complete the following minimum number of semester courses*

14-16 semester hours	29
17-19	28
20-22	27
23-25	26
26-28	25
29-30	24½
31-34	24
35-37	23
38-40	22
41-44	21
45-48	20
49-52	19
53-56	18
57-60	17
61-64	16
65-68	15
69-72	14
73-77	13
78-81	12
82-85	11
86-89	10
90-94	9
95-98	8
99-102	7
103-106	6
107-110	5
111-113	4

Residence Requirements

Four academic years, that is, eight semesters, in residence is the normal amount of time a student may take to earn the B.S.E. degree. This period may be extended by one or two semesters when, in the opinion of a student's academic dean, legitimate reasons underlie the student's failure to be graduated in eight semesters, and reasonable grounds exist for expecting that such extension will enable the student to complete all remaining

*Because of subject matter requirements in some engineering curricula, additional courses may be required for some engineering students to complete degree requirements.

requirements for graduation. A student will not be permitted more than five academic years, that is, ten semesters, in residence in order to be graduated, unless he has been enrolled previously as a special student.

Commencement

Degrees are awarded in June at commencement to those who have completed requirements at the end of either regular semester of the academic year. They are awarded at the end of the summer to students who complete degree requirements in a summer session.

Eligibility for Undergraduate Academic Honors

Dean's List

In recognition of academic achievement, students who earn a *B* average or higher on a semester's work of not less than the normal academic load are placed on the Dean's List.

Class Honors

To be eligible for Class Honors a student must earn, during the year, credit for at least the normal academic load permitted by the college in which he is registered. Students in the freshman, sophomore, and junior classes who earn a *B+* average on all work for the year are eligible for Class Honors.

Graduation Honors

To be eligible for consideration for Graduation Honors a student must have completed a minimum of three years of study at Duke. Students who earn an average of at least a *B+* are recommended for a degree *magna cum laude*. Those who earn an average of *A-* are recommended for a degree *summa cum laude*.

Graduation with Departmental Distinction

Programs featuring independent study are available under the title *Graduation with Distinction* in biomedical, civil, electrical, or mechanical engineering. This honor is awarded to the student who, in the opinion of the department and of a special committee of the faculty, has demonstrated exceptional achievement in the area of his special interest in an independent study project. Interested students should consult the director of undergraduate studies in their departments.

Distinguished Professor Seminars

(See *Bulletin of Undergraduate Instruction* for description.)

Graduate Registration

The requirements regarding who must register are as follows: (1) All students who enter course work or residence for credit; (2) all students who have completed minimum requirements for an advanced degree, but continue to use the facilities of the University in their research; (3) all students in *in absentia* status; and (4) all students who wish merely to audit a course or courses.

After the applicant has received notification of his admission to the Graduate School and has returned his statement of acceptance of admission, he may present himself for registration. During the registration periods, announced in the *Bulletin*, he first confers with the director of graduate studies of his major department, who prepares and signs a course card, listing the course work to be taken during the semester. The student then presents this course card to registration officials, who enroll him officially in his courses. After his first registration period as a current student he will preregister at the stated times for preregistration. Failure to preregister incurs the penalty for late registration. Former students who intend to register to resume a degree program must give the department and the Dean notice of this intention two months before registration.

Late Registration

All students are expected to register or preregister at the times stated in the *Bulletin*. Those registering late are subject to a late registration fee of \$10.00.

Change of Registration

During the academic year within a period of fourteen days from the registration date students may change registration with the approval of the director of graduate studies, if no reduction of fee is involved, and with the approval of the Dean if reduction of fee is involved. Thereafter during the first thirty days from the registration date the only permissible change is dropping course-seminar registration and adding equivalent units of research, with the approval of the director of graduate studies, the instructor of the course, and the Dean of the Graduate School.

Normal Registration

A graduate student is designated as fully registered when he registers for the maximum credit his program requires. Required registration is set in consideration of the student's obligation to teach or assist and the stage he has reached in completion of degree requirements. In the *academic year* normal registration for the resident student who does not

hold an appointment as a part-time instructor or assistant or does not engage in part-time work is 15 units a semester or 30 units an academic year. The normal registration for the student who holds such an appointment or undertakes such work is either 12 units or a minimum of 9, depending upon the number of hours a week he is required to devote to such duties.

The resident student in a terminal master's program carries a normal registration until he has met all requirements except for submitting his thesis. Thereafter, until submission of the thesis, he registers for 3 units a semester while in residence or, if he elects to go out of residence, for 1 unit *in absentia* each semester until the thesis is accepted.

The resident student engaged in a master's program which is not terminal but preparatory to a doctoral program registers as though he were a doctoral student.

The resident student in a doctoral program carries normal registration through the semester in which he passes the preliminary examination. If he remains in residence, he continues to register for a minimum of 3 units a semester until the dissertation is accepted. If, before or after passing the preliminary examination, he elects to go out of residence, he registers for 1 unit a semester *in absentia* in order to keep his program active.

It is necessary to be a fully registered student according to the regulations listed above (except when registered *in absentia*) in order to establish eligibility for library carrel and laboratory space, for student housing, for University and some outside loans, for Student Health service including the voluntary Walker plan coverage, and for reporting status for military duty.

The registration of 1 unit a semester in absentia provides occasional consultation with the thesis or dissertation supervisor. It may be waived for military duty or serious problems of health.

In the Summer Session 6 units a term is maximum registration. Students resident in the academic year who wish to continue study and use of University facilities including Summer Session Student Health during the summer must register for 1 unit in the first Summer Session term. This registration provides use of these facilities for both terms.

Regulations Governing Graduate Degrees

Work in the School of Engineering toward the degree of Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) is taken subject to the regulations of the Graduate School, as well as those of the School of Engineering.

Master of Science Degree

Prerequisites

The degree of Master of Science is offered with a major in the fields of biomedical, civil, electrical, and mechanical engineering. As prerequisites to this degree the student must have earned from an accredited college the Bachelor of Science in Engineering degree, or its equivalent, and completed a minimum of 12 semester hours work in the major field.

Residence Requirements

Credit for courses and seminars, research, and residence, and corresponding tuition and fees are stated in terms of units. One unit is equivalent to one semester hour. The term *residence* designates full-time study and research in close proximity to the facilities provided, as opposed to part-time study incidental to a full-time occupation. For purposes of satisfying the residence requirement of the various degrees, *residence* of one year is defined as two successive academic semesters of *no* less than nine units registration each semester.

Candidates for the Master of Science degree must spend, as a *minimum*, one full academic year, or its equivalent in residence at Duke University. If, after completion of the 30-unit requirement the candidate remains in residence, he must register for a minimum of 3 units per semester.

A master's candidate who in the academic year presents a thesis when not registered in residence will be charged 1 unit of residence for the semester in which the thesis is presented. (For regulations governing work taken or requirements completed during the Summer Session see the *Summer Session Bulletin*.)

Major and Minor Subjects

The work for the Master of Science degree is designed to provide a broad foundation at the graduate level in the fields of biomedical, civil, electrical, and mechanical engineering. The student must present acceptable grades for a minimum of 24 units of graduate courses: at least 12 in course work in his major area of concentration in engineering (not necessarily confined to the offerings of the engineering department in which the student is registered); a minimum of 6 units in a minor subject outside of engineering which lends broad support to his program (usually in mathematics); and the remaining 6 of the 24-unit course requirement in either the major or minor subject, or in an area approved by the major department and by the Dean of Engineering. In addition to the 24-unit course requirement, the student must present a thesis, which carries a credit of 6 units, or be approved by his department for the non-thesis option. This option requires that the student complete an additional 6

units of course work in lieu of a thesis and any additional requirements imposed by his department in the exercise of this option. Earned credit for the degree totals a minimum of 30 units. There is no foreign language requirement for this degree.

Candidacy for the Master of Science Degree

To be considered as a candidate for the Master of Science degree, the graduate student must (1) have made passing grades in all courses taken during the first period of residence (if he registers for fewer than 12 units of graduate courses during his first period of residence, he must make passing grades on the first 12 units of graduate courses), (2) have made a grade of *G* or *E* on at least 3 units of this work, and (3) have received the approval of the major department.

Time Limits for Completion of the Master of Science Degree

The candidates for the Master of Science degree who is in residence for consecutive academic years should complete all requirements for the degree within two calendar years from the date of his first registration in the Graduate School. Any candidate must complete all requirements within six calendar years of his first registration.

Course Load

A graduate student is considered fully registered when he enrolls for the maximum credit his program requires. Required registration is set in consideration of the student's obligation to teach or assist and the stage he has reached in fulfilling his degree requirements. In the *academic year* normal registration for the *resident doctoral student* who does not hold an appointment as part-time instructor or assistant or does not engage in part-time work is 15 units a semester or 30 units an academic year. The normal registration for the *resident doctoral student* who holds such an appointment or undertakes such work is either 12 units or a minimum of 9 units, depending upon the number of hours a week he is required to devote to such duties. The *resident doctoral student* carries such normal registration through the semester in which he passes the preliminary examination. If he remains in residence, he continues to register for a minimum of 3 units a semester until the dissertation is accepted. If he elects to go out of residence, he registers for 1 unit a semester *in absentia* in order to keep his program active.

The *resident* student engaged in a *master's* program requiring a thesis registers as though he were a *resident doctoral student*. However, once he has completed all requirements except the thesis, he may reduce his registration to 3 units per semester. If he decides to go out of residence, he registers for 1 unit *in absentia*. Regulations pertaining to a *resident*

student engaged in a *master's* program requiring no thesis are identical to those described above for the doctoral student until the semester in which his course requirements will be satisfied. At that point, he may reduce his registration to the number of hours necessary for completion of his degree program.

In the Summer Session 6 units a term is maximum registration. Students resident in the academic year who wish to continue study and use of University facilities including Summer Session Student Health during the summer must register for 1 unit in the first Summer Session term. This registration provides use of these facilities for both terms.

The registration of 1 unit a semester *in absentia* provides occasional consultation with the thesis or dissertation supervisor. It may be waived for military duty or serious problems of health. Except in the semester in which a final examination is scheduled, every student is allowed two semesters of *in absentia* registration *without fee* provided that the student is a master's degree candidate who has completed his course requirements or is a doctoral candidate who has passed his preliminary examination. The student qualifying must register at the proper time each semester as "*in absentia*—no fee." The student who takes advantage of this provision while completing a master's program may not again claim it should he proceed into a doctoral program.

It is necessary to be a fully registered student according to the regulations listed above in order to establish eligibility for library carrel and laboratory space, for student housing, for University and some outside loans, for Student Health service benefits, and for reporting status for military duty.

The Thesis

The thesis should demonstrate the student's ability to collect, arrange, interpret, and report pertinent material on his special research problem.

Filing the Thesis Title. On or before March 1 for a June degree or on or before July 1 for a September degree, the student must file with the Dean of the Graduate School, on the official form, the title of the thesis and declaration of intention to graduate. If degree requirements have been met before the deadlines above, the intention to graduate must be filed one month before the thesis is presented. The title must have the approval of the Director of Graduate Studies in the major department, and of the thesis supervisor.

Preparing the Thesis. All basic requirements for preparing the thesis are described in the *Manual of Style for Theses and Dissertations*, revised 1961, obtained at the Duke University Book Store, West Campus. The quality of paper, form, and binding are prescribed in the *Manual*.

Submitting the Thesis. Four typewritten copies of the thesis bound in snap binders secured through the Graduate School Office must be sub-

mitted in approved form to the Dean of the Graduate School on or before May 1 for a June degree or August 15 for a September degree and at least three days before the scheduled date of the student's examination. The copies will then be distributed to the several members of the examining committee. Two copies for the Library and one for the adviser will be bound by the Ruzicka Bindery, fee \$5.00 a volume. The student will state whether or not he wishes more than three so bound.

The Examining Committee and the Examination

The professor who directs the thesis appoints an examining committee composed of himself and two other members of the Graduate Faculty, one of whom must be from a department other than that of the major. If the student has been permitted to take related work *within* the major department, the third member may represent the minor field within the department. This committee is submitted for approval to the Dean of the Graduate School when the thesis is first presented.

The candidate appears before this committee for an examination which lasts for about one and one-half hours. The subject matter covered in the examination is usually restricted to the thesis and to the major field.

If the candidate passes his examination, the examining committee certifies this fact by signing the title page of all copies of the thesis. The candidate then returns the original, the two carbon copies of the thesis, and any others he wishes bound by Ruzicka, to the Dean of the Graduate School, who deposits them in the University Library.

Doctor of Philosophy Degree

The degree of Doctor of Philosophy is offered in the fields of biomedical, civil, electrical, and mechanical engineering. It is essentially a research degree. The granting of the Ph.D. is based primarily upon the student's knowledge of a specialized field of study and upon the production of an acceptable dissertation embodying the results of original research. Although course work is a necessary part of the student's program, the mere accumulation of course credits will not be sufficient for attaining this degree.

Requirements for the Ph.D. Degree

The formal requirements, discussed in detail below, for the Ph.D. degree are as follows: (1) major and minor courses; (2) residence; (3) supervisory committee for program of study; (4) preliminary examination; (5) dissertation; (6) final examination. In order to be considered for candidacy for the Ph.D. degree, the student must have passed all of his course work in the first year of graduate study; on at least 9 units of course work he must have made a grade of G or better.

Major and Minor Subjects. The student must present acceptable grades for a minimum of 48 units of graduate courses: at least 24 in course work in his major area of concentration in engineering (not necessarily confined to the offerings of the engineering department in which the student is registered); a minimum of 12 units in a minor subject outside of engineering which lends broad support to his program (usually in the mathematical or natural sciences); and the remaining 12 of the 48-unit course requirement in either the major or minor subject, or in an area approved by the major department and by the Dean of the School of Engineering.

Residence. For students who first registered in September, 1959, or thereafter, the minimum registration requirement is 60 units of graduate credit not more than 30 units of which may be accepted by transfer. Since a full program is 30 units per academic year, the prospective Ph.D. candidate who enters with the B.S. degree must plan to spend in residence a minimum of two academic years; if he enters with the M.S. degree, his minimum residence is one academic year. If there are undergraduate deficiencies in his program, he may in addition to the minimum requirements be required to take preliminary undergraduate courses for which he will not receive graduate credit. Even if there are no such undergraduate deficiencies, the student's supervisory committee will determine what requirements, if any, above the minimum the student must meet.

For requirement of registration see Normal Registration.

Foreign Languages. A reading knowledge of one acceptable foreign language is required (normally, French, German, or Russian). A student working toward the doctoral degree should complete the language requirement for that degree at the earliest possible date.

The language requirement is waived for students in the Department of Electrical Engineering and may be waived in other individual cases by departmental action. Special courses designed to assist graduate students in acquiring a reading knowledge of French or German are offered.

Committee to Supervise the Program of Study

The director of graduate studies of the major department will, during the first period of full-time registration of each doctoral aspirant, appoint a program advisory committee consisting of three members of the Graduate faculty in areas relevant to the student's intended major. This committee will guide the student in the initial stages of his program.

The Civil and Electrical Engineering Departments require that a qualifying examination be passed during the initial phases of the doctoral program. This qualifying examination is a comprehensive test which deals with topics which would be a part of a normal undergraduate program.

Not later than two months before the preliminary examination the director of graduate studies in the major department will nominate for

approval of the Dean of the Graduate School a supervisory committee of five, one being designated as chairman. This committee will include at least three members of the major department and one from the minor. This committee will administer the preliminary examination and, with such necessary changes as are approved, the final doctoral examination. The final examination may be administered with a minimum of four members.

When the preliminary examination is arranged, the committee and the director will submit to the Dean of the Graduate School the student's program of study bearing a statement that the Department's course and language requirements have been or are being completed.

Preliminary Examination

A student is not accepted as a candidate for the Ph.D. degree until he has passed the preliminary examination. A transfer student who may have passed a preliminary examination elsewhere must nevertheless take the examination in this Graduate School. The examination ordinarily covers both the major and minor fields. The preliminary examination for a student majoring in engineering must contain an oral component of approximately two hours duration and may, at the discretion of the committee, include a written component.

In the summer, a preliminary examination may be scheduled only between the opening and closing dates of the Summer Session.

Privilege of Re-Examination. Should the student fail the preliminary examination, he may apply, with the consent of his supervisory committee and of the Dean of the Graduate School, for the privilege of a second examination to be taken no sooner than three months after the date of the first. Failure on the second examination will render the student ineligible to continue his program for the Ph.D. degree at Duke University.

Time Limitations

1. At the time that the preliminary examination is passed any courses, language certifications, or other credits for advanced standing which are more than six calendar years old will not be accepted toward fulfilling the minimum requirements of the doctoral degree.

2. The student should normally pass the preliminary examination by the end of his second year of graduate study. If he has not passed it by the middle of the third year, he must file with the Dean of the Graduate School a statement explaining the delay and setting a date for the examination. Except under unusual circumstances, extension will not be granted beyond the end of the third year.

3. The doctoral dissertation should be submitted and accepted within two calendar years after the preliminary examination is passed. Should the dissertation not be submitted and accepted within four years after

the examination, the candidate, with the approval of his committee, may petition the Dean of the Graduate School for an extension of one year. Should this extension be granted and the dissertation not be submitted and accepted within the year, the student to remain a candidate for the degree must pass a second preliminary examination. In such a case, the time limit for submitting the dissertation will be determined by the Dean of the Graduate School and the candidate's committee.

Credit for Summer Work

Credit earned in the Summer Session will not reduce the minimum required residence (see section on Residence Requirements).

The Dissertation

The dissertation is expected to be a mature and competent piece of writing, embodying the results of significant and original research.

Filing Title. Not later than March 1 (March 2 if March 1 falls on Sunday) preceding the June commencement at which the degree is expected to be conferred, the student must file with the Dean of the Graduate School, on the official form to be obtained from the Graduate Office, the title of the dissertation. This title must receive the written approval of both the director of graduate studies of the student's major department and the professor who directs the dissertation.

Form. The basic requirements for preparing the dissertation such as quality of paper, form, and binding are prescribed in the instructions for microfilming (see below) and in the *Manual of Style for Theses and Dissertations*, revised 1961, to be obtained from the Duke University Book Store, West Campus.

Submitting Dissertation. The dissertation must be completed to the satisfaction of the professor who directs it. Four typewritten copies bound in snap binders secured through the Graduate School Office must be deposited with the Dean of the Graduate School on or before April 15 preceding the June commencement when the degree is to be conferred. The dissertation must be submitted to the Graduate Office at least seven days before the scheduled date of the student's examination.

Publication on Microfilm. All doctoral dissertations will normally be published on microfilm through University Microfilms, Ann Arbor, Michigan. Authors may, if they wish, also copyright them. The abstract will be published in Dissertation Abstracts. Before final typing is completed, the candidate should obtain in the Graduate Office detailed instructions on the procedure and the microfilming agreement.

Deposit of the Dissertation. After the final examination has been passed, the candidate brings to the Graduate Office the original and first two carbon copies of the dissertation, properly signed, and any other copies he

wishes bound. At this time he signs the microfilming agreement and pays such binding and copyright fees as are due.

Final Examination

The final oral examination shall be primarily on the dissertation. Questions may, however, be asked in the candidate's major field. Except in unusual circumstances approved by the Dean a final examination will not be scheduled when school is not in session.

If a student fails his final examination, he may be allowed to take it for a second time, but not sooner than six months from the date of his first. Permission to take the second examination must be obtained from the professor who directed the dissertation and from the Dean of the Graduate School. Failure to pass the second examination renders the student ineligible to continue work for the Ph.D. degree at Duke University.

Graduate Academic Regulations

Grades, Hours, and Credits

Although ideally graduate study is principally individual reading, research, and laboratory experimentation under guidance, academic progress in the United States is generally measured and recorded in terms of course hours and credits. The term *residence* designates full-time study and research in close proximity to facilities provided for both as opposed to part-time study incidental to a full-time occupation. Here required residence of one year is defined as two successive academic semesters of not less than nine units registration each semester. Credit for courses and seminars, research, and residence, and corresponding tuition and fees are stated in terms of units. According to conventional measurement one unit is equivalent to one semester hour.

Credits Earned Outside this Graduate School

Graduate Credit Earned before the B.S.E. Degree is Granted. Ordinarily no credit will be allowed for graduate courses earned before a student has been awarded his B.S.E. degree. However, an undergraduate student at Duke University who, at the beginning of his final semester, lacks no more than 3 courses of fulfilling the requirements for the B.S.E. degree, may obtain permission from the Dean of the Graduate School to enroll for graduate courses sufficient to bring his total program to fifteen units a week or equivalent. Such graduate courses will be credited toward the M.S. degree, provided that the student meets the requirements for admission to the Graduate School, and that he is duly registered in the Graduate School at the beginning of the final semester.

Under certain circumstances a maximum credit of 6 units may be allowed toward the M.S. degree for graduate courses completed elsewhere. The acceptance of credit up to this amount, however, will not reduce the minimum of required registration at Duke University. (See below.) With the approval of both the student's major department and the Dean of the Graduate School, a student who is granted such transfer credit may be permitted to register for as much as 12 units of thesis research instead of the usual 6 units. Or he may be permitted to fill out his schedule with as much as 6 units of further undergraduate training or 6 units of required language courses on the undergraduate level. In no case will credit be allowed for extension or correspondence courses.

Under appropriate circumstances up to 30 units of graduate credit may be accepted toward the Ph.D. degree for students entering with the M.S. degree from another institution.

Transfer of Graduate Credits. Credit for graduate course work earned at another institution will be determined only after a student has spent one semester at Duke University. After completing his first semester, the student through his director of graduate studies should file a request that his credits be reviewed and a decision be made.

Reciprocal Agreement with the Consolidated University of North Carolina. Under a plan of cooperation between the University of North Carolina and Duke University, students regularly enrolled in the Graduate Schools of the University of North Carolina during the regular academic year, and paying full fees to that institution, may be admitted to a maximum of two courses per semester in the Graduate School of Duke University upon payment of a nominal registration fee of two dollars and of any other special fees regularly required of all students. Under the same arrangements, students in the Graduate School of Duke University may be admitted to course work at the University of North Carolina. A similar arrangement is effective in the Summer Session. (See the *Summer Session Bulletin*.)

Grades

Grades in the Graduate School are as follows: *E*, *G*, *S*, *F*, and *I*. *E* (exceptional) is the highest mark. *G* (good) and *S* (satisfactory) are the remaining passing marks. *F* (failing) is below passing, and *I* (incomplete) indicates that some portion of the student's work is lacking, for an acceptable reason, at the time the grades are reported. The instructor who gives an *I* for a course specifies the date by which the student must have made up the deficiency, in no case more than one calendar year from the date the course ended. If the course is not completed, the grade of *F* is entered upon the student's record unless his appeal to the Dean for the grade No Credit is approved. The grade of *Z* indicates satisfactory

progress at the end of the first semester of a two-semester course. It will be changed to whatever grade is appropriate upon the completion of the course. A grade of *F* in a major course normally occasions withdrawal from a degree program not later than the end of the ensuing semester or term; a grade of *F* in a minor course occasions academic probation.

Courses Primarily for Undergraduates

Students granted provisional admission and others whose preparation is found deficient may on occasion be required as part of their program to take undergraduate courses as prerequisites to continued graduate study. Undergraduate courses thus taken and others elected by the student will carry no graduate credit.

In exceptional cases, 100-level courses *outside the major department* may be taken for graduate credit to a maximum of two one-semester courses or one year-course not exceeding a total of 8 units, when approved by the directors of graduate studies in the major department and in the department in which the course is listed and by the supervisor of the program.

Withdrawal and Interruption of Program

From a Course. For permissible changes during the first thirty days after the registration date, see Change of Registration, page 54. If a course is dropped without the necessary approval, the permanent record will list the course as *Dropped Unofficially, F*. If a course is dropped after the thirty-day period, the status of the student at the time of withdrawal from the course will be determined and be indicated on the permanent record as *Withdrew Passing (WP)* or *Withdrew Failing (WF)*.

From the Graduate School. The University reserves the right, and matriculation by the student is a concession of this right, to request the withdrawal of any student whose conduct at any time is not satisfactory to the University, even though no specific charge be made against the student. If a student wishes for any reason to withdraw from the Graduate School, he should notify both the director of graduate studies in his major department and the Dean of the Graduate School prior to the date of his expected withdrawal. For withdrawal occasioned by academic failure, see above.

Students who find it necessary to interrupt their program of study for a period longer than a summer vacation should, before departure, leave with the Graduate Office a statement of the reason for interruption, mailing address, and expected date of return. If they are subject to registra-

tion *in absentia*, they should arrange for such registration before departure.

A foreign student who after successfully completing a minimum of one semester's graduate study must withdraw for the purpose of returning home before the completion of a graduate program may with the approval of his major department request the Dean to issue him a Certificate of Graduate Study.

Transcript

A student who wishes to transfer his credits from Duke University to another institution may request transcripts of his record. A minimum fee of one dollar, payable in advance, is charged for a single copy. Requests should be directed to the Central Records Office.

Undergraduate Nonacademic Regulations

Release of Student Records

No confidential information contained in student records (academic or otherwise) is released to non-University persons or to unauthorized persons on the campus without the consent of the student. Consent is evidenced by each student's signing a form which authorizes the release of personal data. The form may provide for the release of information to one or more persons or agencies only, or it may be a blanket release. Blank forms to authorize or revise the permission are available in the offices of the deans.

Identification Cards

Undergraduate students are issued two-part identification cards which they should carry at all times. The cards are the means of identification for library privileges, student health services, athletic events, and other University functions or services open to them as University students. Students will be expected to present their cards on request to any University official or employee.

The cards are not transferable, and fraudulent use may result in loss of student privileges or suspension. A student should report the loss of this card immediately to the office of his or her dean. The cost of a new ID card is \$5.00.

Conduct of Students

Duke University expects and will require of all its students continuing

loyal cooperation in developing and maintaining high standards of scholarship and conduct.

The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University as currently in effect or, from time to time, are put into effect by the appropriate authorities of the University.

Any student, in accepting admission, indicates his willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate, for failure to abide by such rules and regulations or for conduct adjudged unsatisfactory or detrimental to the University. Students should also refer to the *Bulletin of Information and Regulations*.



Vibration measurements in a mechanical engineering laboratory.

Courses of Instruction

Undergraduate Engineering Courses

Egr 11. *Introduction to Visual Communication*. Elements of engineering graphics as a means of visualizing and communicating engineering projects. Sketching and drawing techniques to help the engineer illustrate and convey his ideas. Graphical solution of algebraic and calculus problems. Alignment charts and nomograms. Half-course. *Lewis*

Egr 21. *Survey of Engineering*. A course designed to assist the beginning engineering student in obtaining a general view of the profession of engineering, from first college course to ultimate practice of engineering; in gaining a better understanding of the role of the engineer in society; and in relating the various aspects of his academic program to his educational-vocational goals. Two class meeting per week. Half-course. *Kraybill*

*Egr 31. *Computers in Engineering*. Introduction to use of digital computers in engineering, utilizing classroom remote terminals. Attributes of digital computer systems; program languages, flow charts; numerical analysis, including approximation and interpolation, searches and maximization, linear equations; applications to engineering; introduction to decision processes in engineering, including linear programming, optimization network methods; punched card operation; graphical output. Not

*Normally taught by Civil Engineering Department.

open to students who have completed Egr 32, Math 51, or ME 31. One course. *Hill*

*Egr 32. *Computers in Engineering*. Introduction to use of digital computers. Computer systems; algorithms, flow charts; programming, Fortran IV language. Applications to curve fitting, numerical integration, analysis of force systems and their equilibrium and solution of linear equations. Not open to students who have completed Egr 31, Math 51, or ME 31. Half-course. *Clough*

‡Egr 63. *Introductory Electric Systems I*. Complete analysis (transient and steady state) by transform methods of linear lumped parameter networks. Primary emphasis on electric networks but mechanical and electro-mechanical networks included. Application of modern analysis techniques to present day electrical engineering systems that are of concern to all engineers, e.g., amplifiers and transducers. Laboratory included. Co-requisites: Math 63 and Physics 51. (Last offered spring semester, 1970. See EE 63.) One course. *Meier, Owen, and Trickey*

‡Egr 72. *Introduction to System Dynamics*. Unified treatment of mechanical, electrical, fluid, and thermal dynamic systems. Formulation and solution of differential equations; operators, transfer functions, and complex variables. Energy concepts for multiport system analysis. Simulation and analog solution of variety of engineering problems. Prerequisites: Physics 51 and Math 32. One course. *Wright and Macduff*

*Egr 73. *Mechanics of Deformable Bodies*. Stresses and strains in deformable bodies; mechanical behavior of materials and relation of stress to strain; applications of principles to static problems of beams, torsion members, columns, elementary shells; introduction to energy principles, applications. Selected laboratory work. Prerequisite: Egr 23. One course. *Arges, Palmer, and J. F. Wilson*

*Egr 75. *Mechanics of Solids*. Analysis of force systems and their equilibrium as applied to engineering systems. Stresses and strains in deformable bodies; mechanical behavior of materials; applications of principles to static problems of beams, torsion members, and columns. Selected laboratory work. Not open to students who have completed CE 12 (see CE 73). Prerequisite: Physics 51 and Math 32. One course. *J. F. Wilson*

‡Egr 83. *Structure and Properties of Solids*. An introduction to materials science and engineering, emphasizing the relationships between the structure of a solid and its properties. The atomic and molecular origins of electrical, mechanical and chemical behavior are treated in some detail for metals, alloys, polymers, ceramics, glasses, and composite materials. Prerequisites: Chemistry 1 and Math 31. One course. *Pearsall, Shepard, and Clark*

*Normally taught by Civil Engineering Department.

†Normally taught by Electrical Engineering Department.

‡Normally taught by Mechanical Engineering Department.

‡ Egr 104. *Heat Transfer and Thermodynamics*. Fundamentals of heat transfer; multidimensional and unsteady conduction, convection, radiation, combined modes, internal heat generation. Introduction to classical thermodynamics; first and second law, properties, compressible flow, psychrometrics. Prerequisites: Physics 52 and Math 74. One course. *Elsevier and Kenyon*

‡ Egr 113. *Introductory Electric Systems II*. A continuation of Egr 63. Selected laboratory work. (Last offered spring semester, 1970. See EE 113.) One course. *Owen, Pilkington, Wang, and Wells*

‡ Egr 122. *Transport Phenomena*. A unified treatment of momentum, energy and mass transport from the continuum viewpoint, emphasizing the formulation and solution of engineering problems. Conservation laws, constitutive equations, their combinations, and methods of problem solution. Prerequisite: Math 74. One course. *Chaddock and Werner*

* Egr 123. *Dynamics*. General principles of dynamics of engineering systems. Kinematics of motion; dynamics of particles, systems of particles, rigid bodies. Impulse-momentum and work-energy principles. Introduction to advanced methods in dynamics; Lagrange's equation. Prerequisites: Egr 23, Math 63, and Physics 51. (Not offered after 1970-71.) One course. *Clough and Palmer*

* Egr 123. *Dynamics*. An introduction to the principles of particle and rigid body dynamics, with engineering applications. Vector analysis used to describe the kinematics of motion in space and in a plane; the inertia tensor. Concepts of impulse-momentum and work-energy. An introduction to vibrations, wave motion, and Lagrange's equation. Prerequisites: Math 74 and Physics 51. (First offered fall semester, 1971.) One course.

‡ Egr 133. *Heat Transfer*. An introduction to the concepts of conduction, convection and radiation. A study of temperature gradients, steady and transient heat flow by analytical, graphical, numerical, and analogical methods. Selected laboratory work. Prerequisite: Math 63. Corequisite: Egr 101. One course. *Chaddock and Werner*

* Egr 143. *Fluid Mechanics*. Physical properties of fluids, fluid-flow concepts and basic equations; continuity, energy and momentum principles; dimensional analysis and dynamic similitude; viscous effects; applications, emphasizing one-dimensional flow theory for incompressible, real fluids. Selected laboratory work. Prerequisite: Math 63. Corequisite: Egr 123. Half-course. *Kumar and Muga*

* Egr 145. *Fluid Mechanics*. Physical properties of fluids; fluid-flow concepts and basic equations; continuity, energy and momentum principles; dimensional analysis and dynamic similitude; viscous effects; applications, emphasizing real fluids. Selected laboratory work. Corequisite: Egr 123 or ME 123. (First offered fall semester, 1971.) One course.

*Normally taught by Civil Engineering Department.

‡Normally taught by Electrical Engineering Department.

‡Normally taught by Mechanical Engineering Department.

†Egr 163. *Fields*. Treatment of selected topics in field theory of interest to engineers. Basic field concepts, the Laplacian, field sources, waves, diffusion, continuum concepts, the wave nature of elementary particles. The common structure of field theory is applied to selected topics such as thermal conduction, fluid fields, stress-strain in elastic solids, electric and magnetic fields, and electro-magnetic fields. Selected laboratory work. Prerequisite: Math 111. Corequisites: Egr 113, 123, 133, and 143. (Last offered spring semester, 1970. See EE 143.) One course. *George and Pilkington*

Egr 169. *Legal Aspects of Engineering*. A course designed to introduce engineering students to those aspects of the law encountered in the practice of engineering. Subjects included are: contracts and specifications, real and personal property, torts, insurance, agency, equity, evidence, labor management, sales, expert testimony, engineering registration, and ethics. Open to seniors only. One course. *Olive*

Egr 170. *Patent Law for Engineers*. A course designed to familiarize engineering students with the legal principles and procedures for protecting patentable inventions, such as drafting and analysis of specifications and claims, study of infringements, assignments, licenses, and record documentation. Open to seniors only. One course. *Olive*

*Egr 173. *Advanced Mechanics*. Mechanical behavior of elastic, elastic-plastic, viscoelastic and viscoplastic materials. Analysis of stresses and strains in simple structural elements, such as bars, shafts, beams, shells, and pressure vessels made of time-dependent and time-independent materials. Static and dynamic loading. Mechanical properties of solids under high rates of strain. Introduction to fracture mechanics. Brittle and ductile fracture, fatigue. Prerequisite: Egr 83 and Egr 75 or CE 73. One course. *Dvorak*

Egr 183, 184. *Projects in Engineering*. Courses in which engineering projects of an interdisciplinary nature are undertaken. The projects must have engineering relevance in the sense of undertaking to meet human need through a disciplined approach under the guidance of a member of the engineering faculty. Prerequisite: approval of Engineering Faculty Council. Two courses. *Engineering Faculty*

*Normally taught by Civil Engineering Department.

†Normally taught by Electrical Engineering Department.

Biomedical Engineering Courses

Undergraduate Courses

Professor Pilkington, *Chairman*; Associate Professor Clark, *Director of Undergraduate Studies*

BME 161. *Biomedical Measurements*. A study of the basic principles utilized in biomedical data acquisition with applications to the measurement of specific physiological events. Selected laboratory work. Prerequisites: EE 63 or Dynamic Systems Analysis. One course. *Hammond and Thurstone*

BME 162. *Biological Systems Analysis*. Theory of physical system modeling by differential equations with major emphasis on linear dynamic analysis. Selected biomedical applications. Prerequisites: BME 161 and Math 51. One course. *Pilkington and Barr*

BME 181. *Biomedical Modeling*. Introduction to biomedical modeling with particular emphasis on neural and cardiorespiratory systems exhibiting phenomena varying from cellular to the whole organism level. Prerequisites: BME 161 and 162. One course. *Wachtel and Pilkington*

BME 182. *Biomedical Transfer Processes*. An introduction to unit operations and life systems with particular emphasis on biological interactions of artificial materials and prostheses, environmental studies, and hyperbaric exposure. One course. *Clark and Hills*

BME 191-192. *Projects in Biomedical Engineering*. This course is available to seniors who express a desire for such work and who have shown aptitude for research in one area of biomedical engineering. Half-course to 2 courses. *Staff*

Graduate Courses*

Professor Pilkington, *Chairman*; Associate Professor Thurstone, *Director of Graduate Studies*; Associate Professors Clark and Hills; Assistant Professors Barr, Hammond, and Wachtel; Lecturer Wolbarsht

BME 201. *Introductory Biomedical Engineering I*. Fundamentals of biomedical modeling with particular emphasis on neural and cardiorespiratory systems exhibiting phenomena varying from cellular to the whole organism level. Not open to students who have had BME 181. 4 units. *Wachtel and Pilkington*

BME 202. *Introductory Biomedical Engineering II*. An introduction to biomedical transfer processes with particular emphasis on environmental studies, hyperbaric exposure, and the functions of artificial organs and prostheses. Not open to students who have had BME 182. 3 units. *Clark and Hills*

*Offered only upon sufficient demand; enrollment limited.

BME 223. *Biomedical Materials and Artificial Organs*. The use of artificial organs to replace or augment natural function in pumping and oxygenation of blood, removal of nitrogenous wastes and other toxins, and prostheses which have mechanical, chemical, or cosmetic function. Emphasis is placed on molecular architecture of materials for use in biological environment and optimization of parameters of materials which determine their utility in varying applications. 3 units. *Clark*

BME 265. *Advanced Topics in Biomedical Engineering*. Opportunity for study of advanced subjects related to programs within biomedical engineering tailored to fit the requirements of a small group. Prerequisite: approval of the chairman and the instructor under whom work will be done. 1-3 units. *Staff*

BME 311. *Inverse Biomedical Models*. Analytical and computational methods for determining the internal state of a biological system from a set of external measurements and a priori characterization of the system. Difference and integral equation formulations of volume conductor problems, variational methods, perturbation techniques, eigenvalue problems, and quasilinearization. Particular emphasis is placed on the inherent limitations and difficulties encountered in obtaining numerical solutions from inverse formulations and the value of constraints in reducing these difficulties. 3 units. *Pilkington*

BME 333. *Biomedical Imaging*. A study of the fundamentals of information detection, processing, and presentation associated with imaging in biology and medicine. Analysis of coherent and incoherent radiation and various image generation techniques. Also covered will be the psychometrics of image evaluation dealing with subjective and objective parameters. Emphasis will be placed upon sonography, thermography, X-ray, various forms of nuclear radiography, microscopy, and holography. 3 units. *Thurstone*

BME 399. *Special Readings in Biomedical Engineering*. Individual readings in advanced study and research areas of biomedical engineering. Prerequisite: approval of the Director of Graduate Studies. 1-3 units. *Members of the Graduate Staff*

Civil Engineering Courses

Undergraduate Courses

Professor Vesić, *Chairman*; Professor Bryan, *Director of Undergraduate Studies*

CE 12. *Statics*. Analysis of force systems and their equilibrium as applied to engineering systems; algebraic methods used with vector notation where appropriate. Corequisite: Math 32. Half-course. *Arges*

CE 16. *Surveying for Engineers*. The theory and application of measurements required for planning, design, and construction of engineered facilities. Transit-tape and stadia surveys; differential and profile leveling; traverse computations. Laboratory included. Corequisite: Math 31. Half-course. *Arges*

CE 73. *Mechanics of Deformable Bodies*. Stresses and strains in deformable bodies; mechanical behavior of materials and relation of stress to strain; applications of principles to static problems of beams, torsion members, and columns. Selected laboratory work. Prerequisite: CE 12. One course. *Arges*

CE 96. *Location Measurements*. The theory of measurements and errors associated with controlling and locating systems of constructed facilities; modern field methods and equipment. Laboratory included. Prerequisite: Egr 53. Half-course. *Sheppard*

CE 116. *Transportation Engineering*. History of transportation problems; highway, air, pipeline, mass and rapid means of transporting people and materials; design problems requiring the collection and processing of data; selection of transportation means, development of routes, and evaluation of solutions. Concurrent: CE 96. One course.

CE 118. *Materials of Construction*. Determination of physical and mechanical properties of construction materials and their components; use of properties as a basis for design; effect of loading, time, and environment on properties; design of construction materials. Laboratory included. Prerequisites: Egr 73 and 83. Half-course. *Arges*

CE 123. *Water Resources Engineering*. Hydraulics of pressure conduits and measurement of flow, compound pipe systems, analysis of flow in pressure distribution systems, descriptive and quantitative hydrology applied to problems of irrigation and drainage, open channel flow, reservoirs and distribution system storage. Selected laboratory work. Prerequisite: Egr 143. One course. *Muga*

CE 124. *Environmental Engineering*. Qualitative and quantitative physical, chemical, and bacteriological characterization of water and wastewater. Introduction to water treatment processes, and wastewater collection, treatment and disposal systems; elements of environmental sanitation. Laboratory included. Field trips to be arranged. Prerequisite: CE 123 or consent of instructor for non-civil engineering students. One course. *Bryan*

*CE 126. *Sanitary Engineering Design*. Design of facilities for providing an adequate supply of water of good quality, and means for collection, treatment and disposal of municipal and industrial wastewaters. Location and design of treatment works. Field trips to be arranged. Prerequisite: CE 124. One course. *Bryan*

*CE 127. *Environmental Pollution*. A study of the environment—causes

*Offered only upon sufficient demand; enrollment limited.

and effects of air, land, and water pollution. Interactions between the environment and stresses to which it is subjected as a consequence of growth and concentration of populations and their increasing demands on natural resources. Half-course. *Bryan*

CE 131. *Structural Analysis I*. An introduction to the process of applying the engineering method in the creation of structures. A unified treatment of statically determinate and indeterminate structural systems. Prerequisite: Math 73, and CE 73 or Egr. 75. One course. *Brown*

CE 133. *Structural Design I*. Non-homogeneous materials. Determination of physical and mechanical properties of construction materials. Theory and design of compression and flexural members. Emphasis on ultimate strength theory for concrete. Timber design using mechanical fasteners. Selected design problems in concrete to include forms and timber supports. Prerequisite: CE 131. One course. *Palmer*

CE 134. *Structural Design II*. Design in metals, primarily steel. Properties of materials as criteria for failure. Tension, compression, and flexural members. Riveted, bolted, and welded connections, including eccentric connections. Built-up members. Design by elastic and plastic methods. Selected problems to include computations and drawings. Prerequisite: CE 131. One course. *Palmer*

CE 139. *Introduction to Soil Mechanics*. Origin and composition of soils; soil structure. Flow of water through soils; capillary and osmotic phenomena. Soil behavior under stress; compressibility, shear strength. Elements of mechanics of soil masses with application to problems of bearing capacity of foundations, earth pressure on retaining walls, and stability of slopes. Laboratory included. Prerequisites: Egr 83 and 143. One course. *Clough and Vesic*

*CE 140. *Structural Analysis II*. An elective course for students who have a special interest in structures. Fundamental and special methods applied. Introduction to limit design and to matrix and computer methods. Prerequisites: CE 131 and Math 74. One course. *Brown*

*CE 143, 144. *Projects in Civil Engineering*. These courses can be taken as electives by certain seniors who have shown aptitude and interest in research. Permission for enrollment should be secured from the Director of Undergraduate Studies, with the approval of the student adviser and the professor under whom the project will be undertaken. Half-course to two courses.

*CE 146. *Professional Engineering*. Topics related to the practice of civil engineering: engineering economy, contracts, specifications, and ethics. Presentation of student papers on historical and current aspects of civil engineering. Prerequisite: senior standing. Half-course. *Palmer*

*CE 150. *Engineering Systems Analysis*. Systems approach to engineering design, and operation problems. Emphasis on linearized models and

*Offered only upon sufficient demand; enrollment limited.

linear programming. Deterministic models, critical path scheduling, optimization techniques and their application to engineering problems. Prerequisite: senior standing. Half-course.

Graduate Courses*

Professor Vesić, *Chairman*; Associate Professor Muga, *Director of Graduate Studies*; Professors Brown and Bryan; Associate Professors Hill, Kumar, and Palmer; Assistant Professors Clough, Dvorak, and Wilson

CE 201. *Advanced Mechanics of Materials*. Analysis of states of stress and strain; constitutive relations; equilibrium; energy principles and methods. Applications to beam columns, beams on elastic foundations, curved beams, plates and shells; buckling. 3 units. *Dvorak*

CE 202. *Experimental Mechanics*. Experimental analysis of stress and strain; correlation of theory with experimental data; errors; photoelasticity; strain gages; brittle lacquers; similitude principles and design of models; dynamic measurements. 3 units.

CE 203. *Elastic Stability*. The concept of stability and its role in engineering applications. Specific topics to be covered include elastic columns with various end restraint; buckling of frameworks; rings and arches; lateral buckling of beams; buckling of thin plates and shells; utilization of energy theorems and calculus of variations; introduction to dynamic stability. Prerequisite: CE 201. 3 units. *Wilson*

CE 204. *Plates and Shells*. Analysis of stress and deformation in plates; vibrations, buckling of plates. Membrane stress systems in shells; deformations of membrane shells. Introduction to bending theory of shells. Prerequisite: CE 201. 3 units. *Hill*

CE 205. *Elasticity*. Introduction to linear theory of elasticity; plane stress, plane strain, three-dimensional problems of torsion and bending; stress concentrations; torsion of thin-walled sections; complex potential representation. Prerequisite: CE 201. 3 units. *Dvorak*

CE 211. *Mechanical Behavior of Materials*. Micro versus macro aspects of materials; slip deformation; dislocations; general mechanical properties; fracture; simple and combined stress response; design with yield, fracture, creep, relaxation, fatigue, and impact considerations. Co-requisite CE 201. 3 units. *Kumar*

CE 212. *Structural Materials*. Fracture mechanics; viscoelastic, polymeric, and composite materials; strain rate behavior of materials; high velocity and hypervelocity impact. Prerequisite: CE 211. 3 units. *Dvorak and Kumar*

CE 221. *Incompressible Fluid Flow*. Steady and unsteady pipe flow, theories of turbulent flow; water hammer theory and control; surge tanks; air chambers; the analysis and control of fluid systems; effect of resistance; tapered conductors. 3 units. *Muga*

*Offered only upon sufficient demand; enrollment limited.

CE 222. *Open Channel Flow*. Basic principles. Selected flow problems and practical solutions; gutter and inlet flows, flow over spillways, flow into estuaries and bays. Design of open channel structures, river hydraulics. Design of flood control and navigation structures; culverts, bridge openings, energy dissipators. 3 units. *Muga*

CE 223. *Flow Through Porous Media*. Theory of miscible and immiscible fluid displacement processes. Derivation and solution methods. Selected problems in stability, fingering and capillarity. Applications; saline water intrusion, secondary recovery processes, seepage through earthen dams, dewatering of construction sites, well point operation. 3 units. *Muga*

CE 224. *Coastal and Tidal Hydraulics*. Basic analytical concepts; wave phenomena, theory of surface water wave motion, wave modification, internal waves, wave spectra, Selected problems; harbor seiching, moorings, fenders, sand by-passing, breakwater and pier design. 3 units. *Muga*

CE 225. *Engineering Hydrology*. Study of processes governing the origin, distribution, depletion and replenishment of water resources and application of this knowledge to the solution of water supply and drainage problems. Topics include the hydrologic cycle, hydrometeorology, precipitation, runoff, hydrograph analysis, evapotranspiration, infiltration, groundwater, runoff, stream flow, groundwater recharge, and hydrologic measurements. 3 units. *Bryan*

CE 231. *Structural Engineering Analysis*. A study in depth of a number of "classical" topics in structural analysis, such as elastic arch design; plasticity and limit design; numerical and approximate methods of beam deflection analysis. Computer solutions of structural problems. 3 units. *Brown*

CE 232. *Reinforced Concrete Design*. A critical review of research related to the development of existing codes. Special attention is given to the consideration of temperature change effects, shrinkage, plastic flow, bond, shear and diagonal tension. Two-way slab and flat plate design. 3 units. *Brown*

CE 233. *Prestressed Concrete Design*. A critical review of research and recent developments in prestressed concrete design. Prestressed tanks, beams, and columns; partial prestressing and composite design. 3 units. *Brown*

CE 234. *Structural Design in Metals*. Design of metal structures using both elastic and plastic theories. Application to plate girders, bridge trusses, and building frames. Interpretation and justification of building codes and specifications. Planning, preliminary design, and organization of design procedures. 3 units. *Palmer*

CE 235. *Foundation Engineering*. An introduction to methods of

analysis, design and construction of foundations. Bearing capacity and settlement of shallow and deep foundations. Soil exploration; excavation and bracing; drainage and stabilization; underpinning. Foundation vibrations. 3 units. *Vesić*

CE 236. *Earth Structures*. An introduction to methods of analysis, design, and construction of earth structures such as dams, embankments, cuts, canals, airfield and highway pavements. Selection of materials, soil compaction and stabilization. Theory of seepage, design of wells and drainage collectors. Slope stability and related problems. Theory of layered systems and pavement design procedures. 3 units. *Clough*

CE 243, 244. *Sanitary Engineering Unit Operations and Process Design*. Fundamental bases for design of water and waste treatment systems, including transport, mixing, sedimentation and filtration, gas transfer, coagulation, and bio-treatment processes. 6 units. *Bryan*

CE 250. *Engineering Analysis*. A study of selected engineering problems for which ideal mathematical models are formulated, usually in terms of differential equations; use of digital computers; application of infinite series, finite difference calculus, energy, and collocation methods; problem orientation; static and dynamic behavior of rods, beams, plates; diffusion. 3 units. *Wilson*

CE 304. *Advanced Plates and Shells*. General theory of elastic shells; bending of circular cylindrical shells, shells of revolution; analytical solutions; simplified theories. Finite element and finite difference analysis of plates and shells; folded plates; design of plate and shell structures. Prerequisite: CE 204. 3 units.

CE 305. *Advanced Elasticity*. Complex variable methods in theoretical elasticity; stress, displacement, and mixed boundary value problems in plane strain and longitudinal shear (antiplane strain); axial symmetry. Dynamic boundary value problems; moving loads, punches, and cracks. Prerequisites: CE 205, and Math 286. 3 units. *Dvorak*

CE 306. *Plasticity*. A study of the macroscopic state of stress and strain in plastically deformed materials; yield criteria; flow rules; slip line field theory and the solution of boundary value problems for metals and granular media; anisotropy. Prerequisites: CE 205 and 211. 3 units. *Dvorak*

CE 307. *Viscoelasticity*. Models and definitions of viscoelastic solids; viscoelastic functions and their interrelations. Waves, vibrations, and pulse propagation in viscoelastic rods and beams; correspondence principle. Buckling of columns; three-dimensional viscoelasticity; vibrations; quasi-static and dynamic boundary value problems. Measurement of viscoelastic properties. Prerequisite: CE 205. 3 units. *Dvorak*

CE 309. *Advanced Structural Dynamics*. Dynamic stability and the vibrations of discrete and continuous systems; conservative and noncon-

servative systems; parametric excitation; Lyapunov's theorems; wave propagation; random excitation. Prerequisite: ME 203. 3 units. *Wilson*

CE 321. *Mechanics of Ideal Fluids*. Basic equations of ideal fluid flow; potential and stream functions; vortex dynamics; body forces due to flow fluids; methods of singularities in two-dimensional flows; analytical determination of potential functions; conformal transformations; free-streamline flows. Prerequisite: Math 286. 3 units. *Muga*

CE 331, 332. *Advanced Structural Design and Analysis*. Analytical and behavior concepts of structural components as related to the design of structural systems; classical methods; numerical and approximate techniques; behavior of structural elements under static and dynamic loading; buckling behavior. Prerequisite: CE 231. 6 units.

CE 335. *Mechanical Behavior of Soils*. Origin of soils, soil minerals and processes of soil formation; physical chemistry of multiphase systems and soil structure. Permeability of flow of water through soils; capillary and osmotic phenomena; soil compressibility; theory of consolidation; shear strength and failure criteria. Stress-strain relationships, volume changes and pore pressures during shear. Strength properties. Advanced laboratory soil testing techniques. 4 units. *Vesic*

CE 336. *Advanced Soil Mechanics*. Theories of plastic and elastic equilibrium of soil masses and their application to analysis of problems such as: pressure on retaining walls, anchored bulkheads, cofferdams, silos, shafts, tunnels; stability of slopes; stresses and settlements in soil masses and pavements; piles and pile groups subjected to lateral loads. Prerequisite: CE 335. 4 units. *Vesic*

CE 337. *Elements of Soil Dynamics*. Behavior of soils and foundations under transient and impact loads. Mechanics of pile driving. Foundation vibrations. Effects of explosions on soils; wave propagation; cratering. Earthquake effects on foundations, earth dams, and slopes. Compaction of loose soils by explosives or by vibration. Behavior of layered systems under dynamic loads. Prerequisite: CE 335. 3 units. *Clough*

CE 338. *Rock Mechanics*. Behavior and properties of rock as an engineering material; failure of rock. Design and construction of underground structures and slopes in rock; design of rock abutments for dams. Laboratory and field rock testing techniques. 4 units. *Clough*

CE 365. *Advanced Topics in Civil Engineering*. Opportunity for study of advanced subjects relating to programs within the Civil Engineering Department tailored to fit the requirements of a small group. 1 to 3 units. *Members of the Graduate Staff*

CE 399. *Special Readings in Civil Engineering*. Special individual readings in a specified area of study in civil engineering. Prerequisite: approval of the Director of Graduate Studies. 1 to 3 units. *Members of the Graduate Staff*

Electrical Engineering Courses

Undergraduate Courses

Professor Owen, *Chairman*; Professor Meier, *Director of Undergraduate Studies*

EE 42. *Introduction to Digital Systems*. A course designed for students who have no previous exposure to switching or Boolean algebra. Its main objective is to introduce the student to certain basic notions of switching algebra and to acquaint him with the application of these concepts to digital systems design. Elements of set theory, the laws of symbolic logic, formulation of logic expressions, simplification of switching functions are some of the theoretical topics to be discussed. The portion of the course dealing with applications covers both combinational and sequential digital networks, and provides an excellent opportunity for the actual hardware implementation of such networks utilizing available relay and electronic logic modules. Selected laboratory work is required. One course. *Marinos*

EE 63. *Electric Networks*. Complete analysis (transient and steady state) by transform methods of linear lumped parameter networks. Application of modern analysis techniques to contemporary electrical engineering problems. Laboratory included. Prerequisite: Phys 52. Co-requisite: Math 73. Fall and spring semesters. (First offered fall semester, 1970.) One course.

EE 103. *Introduction to Nonlinear Network Theory*. Introduction to theory and techniques for analysis and synthesis of nonlinear circuits. Characterization of 2-, 3-, and n-terminal nonlinear network elements. Laws for interconnecting elements and determining equilibrium equations. Operating points, driving-point and transfer-characteristics plots. Graphical and numerical analysis and synthesis of dc and ac nonlinear resistive functional networks. Nonautonomous first-order nonlinear networks, and autonomous second-order nonlinear networks. Methods of isoclines. Some laboratory and computer simulations. Prerequisite: EE 63. Fall semesters. (First offered fall semester, 1970.) One course.

EE 113. *Introductory System Theory*. Modeling of physical systems and mathematical representations of dynamic systems. The concept of states, inputs, outputs, and systems. Classification of systems and types of input; Fourier series and transforms. Solutions of vector differential and difference equations. Properties of multivariable systems, equivalent representation and minimum realization of a transfer function matrix. Introduction to stochastic systems. Analog and digital computer simulation. Prerequisites: EE 63 and Math 73. Fall and spring semesters. (First offered fall semester, 1970.) One course.

EE 143. *Fields and Continua*. This course introduces the physical

concepts used in the description of fields and continua and relates these concepts to mathematical descriptions which permit a quantitative treatment of phenomena of interest to the engineer. Physical fields include: fluid flow, thermal (heat flow), radiation, electric, magnetic, electromagnetic, and stress strain fields. Laboratory and computer applications will be used to assist in the learning of the material. Prerequisites: Math 74 and Phys 52. Spring semesters. (First offered spring semester, 1971.) One course.

EE 157. *Introduction to Switching Theory*. Techniques for the analysis and design of combinational and sequential switching networks. Boolean algebras; elements of code theory; minimum-complexity combinational networks; threshold logic; functional decomposition; minimum-complexity sequential networks; asynchronous sequential networks; clocked sequential systems; hazards in switching systems. Selected laboratory work. Normally open to juniors and seniors. Fall semesters. (First offered fall semester, 1970.) One course.

EE 161. *Electronics and Signals*. Techniques for the analysis and design of electronic circuits with emphasis on graphical and piece-wise-linear methods; applications of these methods to particular circuits, including transistor and tube amplifiers, oscillators and switching circuits. Introduction to amplitude-, frequency-, and pulse-modulation systems. Prerequisite: EE 113. Three class sessions and one computation or laboratory session. One course. *Wilson*

EE 162. *Electromechanical Energy Conversion*. Principles of energy storage and conversion utilizing magnetic and electric fields; analytical treatment of dynamic equations of motion, including the Euler-Lagrange approach; applications to the design of electromechanical transducers and rotating machines. Prerequisites: EE 113 and EE 143. One course. *Trickey and Wilson*

EE 163. *Physical Electronics*. Study of physical processes under the influence of electric, magnetic, thermal, and stress fields with contemporary electrical engineering applications: e.g., transistors, thermoelectric energy converters, and magnetic devices. Prerequisite: EE 143. Co-requisite: EE 164. Three class sessions and one computation or laboratory. One course. *George and Hacker*

EE 164. *Electromagnetic Fields and Waves*. Electric and magnetic fields; Maxwell's equations developed from Coulomb's, Ampere's and Faraday's laws and the solenoidal nature of the magnetic field; electrostatics; magnetostatics; quasi-static and stationary fields; electromagnetic waves; retarded potential; relaxation time, reflection, polarization, and radiation of electromagnetic waves; transmission lines; probability waves in periodic structures. Prerequisite: EE 143. Three class sessions and one computation or laboratory. One course. *Joines and Kerr*

EE 167. *Design Colloquium*. A course planned to guide the student in learning how the fundamental principles studied in the academic program

are translated into the realities of engineering practice. The vehicle will be an extensive and intensive study of a significant modern engineering project. Extensive reference to published information and possible site visits to the projects will be part of the mode of operation, as will written and oral reports. One course. *Meier*

EE 173-174. *Projects in Electrical Engineering*. A course which may be undertaken only by seniors who are enrolled in the Graduation with Distinction program, or who show special aptitude for individual project work. Consent of the Director of Undergraduate Studies required. Elective for electrical majors. Half course to two courses. *Staff*

EE 185. *Pulse and Digital Electronics*. Generation and shaping waveforms encountered in information processing systems, such as radar, computer, control and instrumentation. Typical circuit functions included are linear and nonlinear wave shaping, pulse and time-base generation, time delay, counting and gating. Emphasis on the application of semiconductor devices to the realization of circuit functions. Prerequisite: EE 161. Three class sessions and one computation or laboratory session. One course. *George*

EE 186. *Modulation Systems and Noise*. Analysis and design of modulation systems. Description of deterministic and probabilistic signals; power spectra; sampling theory; amplitude- and frequency- and pulse-modulation systems; pulse-modulation techniques. Sources and characteristics of noise; comparison of various modulation systems. Prerequisite: EE 161. Selected laboratory work. One course. *Wang*

EE 187. *Electronic Processes in Materials*. Prediction and explanation of the response of ferroelectric, magnetic, superconductor, and semiconductor materials to thermal, electric, magnetic and stress fields. Exploration of possibilities of improving the materials. Three class sessions and one computation or laboratory. Prerequisite: EE 163. One course. *Hacker*

EE 188. *Dynamics of Electromechanical Energy Conversion*. An analytical and experimental study of the dynamic characteristics of electromechanical energy conversion devices that are utilized in both control and power applications. Three class sessions and one three-hour laboratory. Prerequisite: EE 162. One course. *Trickey*

EE 195. *Nuclear Engineering Fundamentals*. Review of nuclear physics; fission and the chain reaction; nuclear reactor principles and concepts; materials, instrumentation, and control of nuclear reactor; selected topics in nuclear engineering. Prerequisite: permission of instructor. One course. *Meier*

EE 196. *Microwaves and Quantum Electronics*. A study of the special field and circuit techniques required at microwave frequencies; electromagnetic wave propagation in unbounded and bounded media; transmission and reflection properties of various microwave networks. Equivalent circuits and matrix methods will facilitate analysis. Discus-

sion of microwave amplifiers and oscillators, including klystrons, magnetrons, traveling-wave tubes, and masers. Selected laboratory experiments. Prerequisite: EE 164. Three class sessions and one computation or laboratory. One course. *Joines*

EE 199. *Linear Feedback Systems*. Analysis and design of linear, continuous-data feedback control systems; stability tests; time and frequency domain methods; root locus method; performance specifications; study of electrical, mechanical, hydraulic, aerodynamic, pneumatic, and thermal systems. Three class sessions and one three-hour laboratory. Prerequisite: permission of instructor. One course. *Wells*

Graduate Courses*

Professor Owen, *Chairman*; Professor Artley, *Director of Graduate Studies*; Professors Kerr, Meier, Pilkington, Trickey (Visiting), and Wilson; Associate Professors Hacker, Joines, Marinos, Nolte, Thurstone, and Wells; Assistant Professors George and Wang

EE 203. *Random Signals and Noise*. Introduction to mathematical methods of describing and analyzing random signals and noise. Review of basic probability theory; joint, conditional, and marginal distributions; random processes. Time and ensemble averages, correlation, and power spectra. Optimum linear smoothing and predicting filters. Introduction to optimum signal detection and parameter estimation, with applications such as radar. Selected laboratory work. Fall semesters. 3 units. *Kerr and Nolte*

EE 204. *Information Theory and Communication Systems*. Information and entropy and their application in communication situations. Noise and channel capacity, coding, and the fundamental theorem of information theory. Continuous channels and transmission of band-limited signals. Comparisons of various practical modulation techniques from the standpoint of information rate and error probability. Prerequisite EE 203. Spring semesters, 1972, 1974. 3 units. *Kerr and Nolte*

EE 205. *Signal Detection and Extraction Theory*. Fundamentals of signal detection theory and its application to radar, sonar, and communication systems. Design of optimum detectors for known signals, for signals with unknown parameters, and for signals transmitted through fading channels. Analysis and comparison of optimum noise immunity of practical amplitude, pulse, and frequency modulation systems. Prerequisite: EE 203 or permission of instructor. Spring semesters, 1971, 1973. 3 units. *Nolte*

EE 208. *Digital Computer Design*. Fundamentals of digital arithmetic; hardware implementation of combinational and sequential logic circuits; adders, multipliers, switching matrices, shift registers, counters, compara-

*Offered only upon sufficient demand; enrollment limited.

tors, and character generators. Detail design of a simple digital computer system. Selected laboratory work. Prerequisite: EE 157 or permission of instructor. Spring semesters, 1971, 1973. 3 units. *Marinos and Owen*

EE 211. *Solid State Theory*. The fundamental theory of wave motion in solids. Wave mechanics; variational method; perturbation theory; many-electron problems; one-electron approximation; free-electron approximation; electron spin; Brillouin zones; time-dependent Schrödinger's equation; and transition probabilities. Introduction to thermostatics and statistical mechanics. Prerequisite: permission of instructor. Fall semesters. 3 units. *Artley and Hacker*

EE 212. *Solid State Materials*. Concepts of solid state physics as applied to engineering materials; electric, magnetic, thermal, and mechanical properties of solids; dielectrics; semiconductors; magnetic materials; and superconductors. Selected laboratory work. Prerequisite: EE 211. Spring semesters, 1972, 1974. 3 units. *Artley and Hacker*

EE 213. *Principles of Magnetism*. Classical field theory and quantum mechanical descriptions of magnetic properties of materials. Diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism, and ferrimagnetism. Resonance and relaxation in magnetic materials. Anisotropy, magnetostriction, domain theory and switching properties. Selected topics to relate theory of magnetism to applications of engineering interest. Prerequisite: EE 211 or permission of instructor. Spring semesters, 1971, 1973. 3 units. *Artley and Hacker*

EE 215. *Semiconductor Physics*. A quantitative treatment of the physical processes that underlie semiconductor device operation. Topics include: band theory and conduction phenomena; equilibrium and non-equilibrium charge carrier densities; charge generation, injection, and recombination; drift and diffusion processes; low and high field conduction. Prerequisite: EE 211 or permission of instructor. 3 units. *Staff*

EE 217. *Masers*. Principles of masers, particularly optical masers. Discussion of quantum electronics, optical configuration; solid state, gaseous, and liquid devices; modulation; high power operation. Prerequisite: permission of instructor. Two class sessions and laboratory. 3 units. Spring semesters, 1971, 1973. *George*

EE 222. *Nonlinear Analysis*. Introduction to methods of analyzing engineering systems described by nonlinear differential equations: analytic, numerical, graphical, and series approximation methods; analysis of singular points; stability of nonlinear systems. Applications of various methods, such as the modified Euler, Runge-Kutta, isoclines, perturbation, reversion, variation of parameters, residuals, harmonic balance, Bendixon, and Liapounov to phenomena of nonlinear resonance, subharmonics, relaxation oscillations, and forced oscillating systems. Prerequisite: permission of instructor. Fall semesters. 3 units. *Wilson*

EE 225. *Semiconductor Electronic Circuits*. Analysis and design of electronic circuits utilizing a variety of static and dynamic models of

semiconductor devices. Transistor and other semiconductor device circuit models; bias stability; high frequency and noise models; switching characteristics; illustrative semiconductor circuits. Prerequisite: permission of instructor. Selected laboratory work. Spring semesters. 3 units. *George*

EE 227. *Network Synthesis*. Linear network theory, including a review of time and frequency domain analysis; network graphs; network functions and realizability condition; driving point impedance synthesis of passive networks; driving point and transfer specifications; approximation methods. Prerequisite: permission of instructor. Fall semesters, 1970, 1972. 3 units. *George and Marinos*

EE 241. *Linear Control Systems*. Theoretical and applied principles of design of linear, continuous-data control systems. Integration of system elements into a closed loop system. Stability from Routh, Nyquist and root locus viewpoints. Time and frequency domain methods. Performance improvement using compensation. Disturbances and multiple inputs. Two class sessions and one three-hour laboratory. Prerequisite: permission of instructor. Credit not given for both EE 199 and EE 241. Fall semesters. 3 units. *Wells*

EE 243. *Advanced Linear Systems Theory*. Definition of a linear, dynamical system; mathematical preliminaries including set theory, linear algebra, vector differential and difference equations; concepts of state space and state variables; state-model description, multivariate systems; the basic existence and uniqueness theorem, stability, transfer function, transition matrix and zero-state, zero-input responses of the system; concepts of reachability, controllability, observability and their practical implications. Transformation and equivalence of linear systems. Prerequisite: permission of instructor. Fall semesters. 3 units. *Wang*

EE 244. *Selected Topics in Control Systems*. Analysis and design of linear sampled-data systems using Z-transform and modified Nyquist approaches. Analysis of linear systems with statistical inputs and nonlinear systems using describing functions. Analog and digital computer techniques for the solution of appropriate problems. Prerequisite: EE 203 and either EE 199 or EE 241. Spring semesters 1972, 1974. 3 units. *Wells*

EE 259. *Advanced Electric Energy Conversion*. Equations of motion of electromechanical systems; fields and lumped parameters, state function concepts; mathematical techniques for analyzing electromechanical devices and systems; transducers; unified treatment employing matrix, tensor, and block-diagram concepts to obtain response under static and dynamic conditions; the generalized rotating machine. Prerequisite: permission of instructor. 3 units. *Trickey*

EE 265. *Advanced Topics in Electrical Engineering*. Opportunity for study of advanced subjects related to programs within the electrical engineering department tailored to fit the requirements of a small group.

Prerequisite: approval of the Director of Graduate Studies and of instructor under whom work will be done. 1 to 3 units. *Staff*

EE 271. *Electromagnetic Theory*. The classical theory of Maxwell's equations; electrostatics, magnetostatics, boundary value problems including numerical solutions, currents and their interactions, force and energy relations. Three class sessions. Prerequisite: permission of instructor. Fall semesters. 3 units. *Joines*

EE 272. *Application of Electromagnetic Theory*. Propagation of electromagnetic waves in various structures and media; mathematical description of microwave networks, including equivalent circuits and matrix methods; microwave circuit theorems and synthesis techniques. Selected laboratory experiments. Prerequisite: EE 271. Spring semesters 1972, 1974. 3 units. *Joines*

EE 304. *Advanced Statistical Analysis and System Design*. Advanced statistical techniques useful for analysis and design in both communication and control systems. Introduction to statistical decision theory, and design to minimize average risk. The Bayesian approach to parameter estimation, smoothing, prediction, and signal detection. Wiener-Kalman filters and their application to signal processing in control situations. Prerequisite: EE 203. Spring semesters, 1972, 1974. 3 units. *Kerr*

EE 305. *Advanced Applications of Statistical Decision Theory*. Optimum modulators and demodulators, comparison of various systems, Gaussian signals in Gaussian noise, sonar-radar problem, representation of narrow band processes, slowly-fluctuating targets, optimum receiver for estimating range and Doppler, properties of auto-correlation functions and ambiguity functions, pseudorandom signals, resolution, frequency spreading, reverberation, active sonar, optimum space-time system, passive sonar. Prerequisite: EE 205. Fall semesters, 1970, 1972. 3 units. *Nolte*

EE 306. *Adaptive Detection and Communication Systems*. Sequential detection, Wald's sequential probability ratio test, sequential tests of composite hypotheses, deferred decision theory; adaptive systems, nondecision-directed and decision-directed measurements, adaptive on-off communications system, transmitted reference systems, detection systems employing the learning feature, learning with and without a teacher, pattern recognition. Applications to communication systems. Prerequisite: EE 205. Fall semesters, 1971, 1973. 3 units. *Nolte*

EE 307. *Advanced Digital Systems—I*. A unified treatment of finite-state deterministic systems. Models and elementary properties of sequential machines; sequential machine compatibility; equivalence and state minimization; state assignment for sequential machines; state and machine identification experiments; asynchronous and speed independent switching circuits; theory of regular expressions. Prerequisite: EE 157 or permission of instructor. Fall semesters, 1971, 1973. 3 units. *Marinos*

EE 308. *Advanced Digital Systems—II*. A continuation of EE 307. Machine decomposition; design of reliable systems from unreliable com-

ponents; probabilistic and fuzzy automata; recognition devices; automata and their relation to context-free languages. Prerequisite: EE 307 or permission of instructor. Spring semesters 1972, 1974. 3 units. *Marinos*

EE 311. *Quantum Theory of Materials*. Concepts of the quantum theory of solids as applied to engineering materials. Topics selected will vary with the interests of the class, but the importance of quantized field of crystals (phonons, magnons, plasmons, excitons, and polarons) and the interaction of these fields will be stressed. Prerequisites: EE 211 and Physics 316. 3 units. *Pilkington*

EE 313. *Magnetic Processes in Materials*. Selected topics in magnetism. Cryomagnetism, spin wave resonance, interaction of superconductor and ferromagnetic materials, nonlinear spin wave theory, ferrimagnetic exchange, double exchange, superexchange, effects of finite dimensions and interfaces on basic properties of ferromagnets. Microwave applications. Prerequisite: EE 213, or permission of instructor. Fall semesters, 1971, 1973. 3 units. *Artley and Hacker*

EE 315. *Semiconductor Devices*. Derivation of the d-c and incremental electrical characteristics of p-n junction and junction transistors; equivalent circuit models; parameter determination; implication and limitations of models for describing device operation; thermal runaway; avalanche device operation; thin film, multi-junction and other modern devices. Prerequisite: EE 215. 3 units. *Staff*

EE 321. *Nonlinear Magnetic and Semiconductor Circuits*. Mathematical description of nonlinear magnetic and semiconductor characteristics; transient and steady-state analysis and synthesis of nonlinear systems with application to such topics as magnetic amplifiers, frequency converters, oscillators, computer logic, switching devices, and inverters. Prerequisite: permission of instructor. Spring semesters, 1971, 1973. 3 units. *Wilson*

EE 324. *Nonlinear Oscillations in Physical Systems*. Analysis of phenomena encountered in free and forced oscillating systems: stability criteria, topological methods, degenerate systems and discontinuous theories, relaxation oscillations, asymptotic approaches. Emphasis on interdependence of physical and mathematical reasoning in analyzing nonlinear electrical and mechanical systems. Illustrative examples selected to meet interests of class. Prerequisite: EE 222. Spring semesters, 1972, 1974. 3 units. *Wilson*

EE 342. *Introduction to Optimal Control Theory*. The state space formulation for both continuous and discrete linear systems. The theory of optimal control, as approached by the methods of calculus of variations, Pontryagin, and dynamic programming. Examples of two point boundary value problems, and minimization of quadratic functionals. Prerequisite: permission of instructor. Spring semesters, 1971, 1973. 3 units. *Wang*

EE 345. *Stochastic Control Systems*. Wiener process, Poisson's pro-

cesses, Markov chains, stochastic finite-state machines and semi-Markovian processes. Stochastic control systems, stability of stochastic systems. Mean square error analysis, Wiener filters, statistical equivalent linearization and identification of control systems by statistical techniques. Fixed-memory, expanding-memory, fading-memory filters and Kalman's filters. Stochastic dynamic programming and optimization of stochastic control systems. Prerequisites: EE 203 and EE 243. Spring semesters, 1972, 1974. 3 units. *Wang*

EE 361, 362. *Electrical Engineering Seminar*. A weekly seminar in which graduate students and the faculty in electrical engineering meet to discuss research and professional activities. Presentations and discussions by faculty, students and persons visiting the campus are directed toward increased understanding of scientific and professional activities at local, regional, national and international levels. Selected articles from scientific and professional journals are reviewed by students with the objective of providing a continued overview of relevant and significant publications in the current literature. Although this course carries no graduate credit, it is expected that each graduate student will participate in the seminar for at least two semesters while in residence at Duke University. Fall and spring semesters. *Artley*

EE 371. *Advanced Electromagnetic Theory*. An advanced treatment of topics in electromagnetic theory selected from the interests of the instructor and students. Representative topics are propagation in anisotropic media, plasma waves, antennas, and boundary value problems. Prerequisite: EE 272. 3 units. *Artley*

EE 373. *Selected Topics in Field Theory*. An advanced treatment of topics in generalized field theory selected from the interests of the instructor and the students. Representative topics are generalized fields, electromagnetic interactions, quantum electrodynamics, inhomogeneous media, and diffusion phenomena. Prerequisite: EE 272. 3 units. *Artley*

EE 375. *Interaction of Electron Beams and Waves*. Treatment of space-charge waves, slow-wave structures, and electron beams in various configurations such as traveling wave tubes, klystrons, and magnetrons; application of coupled-mode theory. Prerequisite: EE 272. Selected laboratory work. Fall semesters, 1971, 1973. 3 units. *George*

EE 399. *Special Readings in Electrical Engineering*. Special individual readings in a specified area of study in electrical engineering. Prerequisite: approval of the Director of Graduate Studies. 1-3 units. *Staff*

Mechanical Engineering Courses

Undergraduate Courses

Professor Chaddock, *Chairman*; Professor Kenyon, *Director of Undergraduate Studies*

ME 31. *Engineering Applications of Digital Computation*. An introduction to digital computation, including preparation of mathematical models from physical parameters. Programming the model for the digital computer. Applications are drawn from the basic areas of mechanical engineering and include propulsion, power, machines and transport. One course. *Buzzard*

ME 101. *Thermodynamics*. An introduction to both classical and statistical thermodynamics. The laws of classical thermodynamics are presented and applied to open and closed systems. Continuum properties, processes, and cycles are included. Molecular distribution and property evaluation, especially entropy, are considered from the statistical and quantum viewpoints. Prerequisites: Physics 52, Math 73. One course. *Harman, Elsevier, and Kenyon*

ME 102. *Thermodynamics II*. Continuation of the study of the basic laws and processes of thermodynamics with emphasis on energy conversion and property evaluation. Included are combustion and chemical equilibrium, gas mixtures and psychrometrics, and power cycles. One course. *Elsevier*

ME 111. *Physical Metallurgy*. Extension of the principles of Egr 83 to the metallic state; atomic, experimental and thermodynamic approaches to metallurgy; phase transformations and hardening mechanisms, relationships between the structure of alloys and plastic behavior with emphasis on engineering alloy systems. Prerequisite: Egr 83. One course. *Shepard*

ME 112. *Polymer Science*. Extension of the principles of Egr 83 to high molecular weight polymers, especially those which have significant engineering applications; structure and properties of polymers; polymerization mechanisms; properties of commercial polymers; polymer processing. Prerequisite: Egr 83. One course. *Pearsall*

ME 123. *Dynamics*. The principles of dynamics are introduced using vector analysis of particles and systems of particles. Equations of motion, impulse-momentum and work-energy ideas are applied to two dimensional rigid bodies and mechanisms. Graphical solution of vector equations is emphasized. Non rigid (fluid) applications of impulse momentum are studied in detail. LaGrangian dynamics is introduced in the study of vibrating discrete masses. Prerequisites Math 73, Physics, 51. One course. *Meriam, Nash, and Wright*

ME 126. *Fluid Mechanics*. An introductory course emphasizing the application of the principles of conservation of mass, momentum, and energy to a fluid system. Physical properties of fluids, dimensional analysis and similitude; viscous effects and integral boundary layer theory; subsonic and supersonic flows; normal shock waves. Selected laboratory work. Corequisites: ME 123 and ME 101. One course. *Buzzard*

*ME 128. *Dynamics of Gases*. The flow of compressible fluids at high

*Offered only upon sufficient demand; enrollment limited.

velocities. One-dimensional compressible flow: area change; normal shock; friction and heat transfer; Mach number. Prerequisite: ME 102. One course. *Buzzard*

*ME 135. *Vibration Control*. An introduction to the dynamics of mechanical systems; equilibrium, stability, lumped and distributed systems. System analysis by classical differential equations, mechanical impedance, and computer methods. Prerequisites: Math 73 and Egr 72. One course. *Macduff*

ME 136. *Response of Systems*. System design for optimum dynamic response. Development of mathematical models from physical systems, operational and computer techniques, matrix methods for lumped and distributed systems, instrumentation and testing of components and systems, effect of nonlinearities. Prerequisites: Math 74, ME 123, and Egr 72. One course. *Macduff and Linderoth*

ME 141. *Mechanical Design I*. A study of the broad aspects of mechanical design starting with the creative process and considering the effects of economics, human factors, ethics and prior art on design. Basic mechanical components such as gears, cams, bearings, springs, shafts, etc. will be introduced in the discussions so that the student will become familiar with their design and application. A term design project will serve to practice the application of the design process. Prerequisite: ME 123. One course. *Linderoth and Nash*

ME 142. *Kinematics and Dynamics of Machinery*. Study of the geometry of mechanisms. An introduction to the mathematics of gears, cams, linkages and intermittent motion devices. The kinematics and kinetics of linkages. Computer solutions for linkage problems. Prerequisite: Math 63. Corequisite: Egr 123. One course. *Linderoth and Nash*

ME 143. *The Design of Machine Elements*. The detail design of machine elements. Study of the problems of stress and strain (deflections) as they affect and modify design requirements. Reliability and safety as design parameters. Prerequisite: ME 141. One course. *Linderoth and Nash*

ME 150. *Heat and Mass Transfer*. Study of the mechanisms of heat transfer processes. Steady and transient conduction in solids, numerical and graphical methods; heat exchanger design, performance; thermal radiation; convective processes, turbulent and laminar flow, steady and transient diffusion, mass transfer between phases. Prerequisites: ME 126 and Math 74. One course. *Werner and Chaddock*

*ME 153. *Heating, Air Conditioning and Refrigeration*. Principles of thermodynamics, heat transfer and fluid flow applied to comfort and industrial air conditioning. Cycles and equipment for heating, cooling, and humidity control. Air transmission and distribution. Modern vapor compression, absorption and low temperature refrigeration cycles and systems. Prerequisite: ME 102. One course. *Elsevier*

*Offered only upon sufficient demand; enrollment limited.

*ME 156. *Combustion Engines*. A study of cycles, fuels, and fuel mixtures in piston, ram jet, and rocket engines. Comparison of real and theoretical cycles; carburetion and fuel injection systems; modern developments. Prerequisite: ME 102. One course. *Elsevier*

ME 165-166. *Special Topics in Mechanical Engineering*. Study arranged on a special engineering topic, in which the faculty has particular interest and competence as a result of its research and professional activities. Prerequisite: permission of the instructor and Director of Undergraduate Studies. Half-course to one course. *Staff*

*ME 172. *Kinematics of Mechanisms*. Analysis of velocities and accelerations in a moving rigid link; techniques for determining velocities and accelerations in mechanisms; introduction to kinematic and geometric synthesis. Prerequisite: ME 123 or ME 133. One course. *Nash*

ME 173. *Ocean Engineering*. An introductory course to acquaint the student with the basics of physical and chemical oceanography and the need for and application of engineering knowledge and methods to the design and operation of structures, vehicles, and communications systems for use on and in the oceans. Prerequisite: junior standing in any department or division. One course. *Linderoth and Muga*

*ME 177. *Computer Techniques for Simulation and Design*. Modern analog and digital computation used in the design of advanced engineering systems. Problems described by linear and nonlinear differential and algebraic equations will be solved. Linkage-cam mechanisms, heat exchangers, rocket nozzles, missile roll control, and aircraft stability are typical problem topics. One course. *Wright*

*ME 182. *Fundamentals of Nuclear Engineering*. Review of nuclear physics, nuclear interactions and cross sections, neutron induced chain reactions, shielding, hazards, isotope utilizations, reactor systems, and power reactors. Prerequisite: permission of instructor. One course. *Kenyon*

*ME 183. *Power Plants*. Basic concepts of thermodynamics, heat transfer and fluid flow are combined with industrial data for the consideration of real power plant problems. Selection of steam generators, prime movers, fans, pumps, heaters, and piping systems with regard to engineering and economic points of view. One course. *Kenyon*

ME 197-198. *Projects in Mechanical Engineering*. This course may be assigned by the Chairman of the Department to outstanding seniors who express a desire for such work and who have shown aptitude for research in one distinct field of mechanical engineering. Prerequisites: B average and senior standing. Half-course to two courses. *Staff*

Graduate Courses*

Professor Chaddock, *Chairman*; Associate Professor Harman, *Director of*

*Offered only upon sufficient demand; enrollment limited.

Graduate Studies; Professors Kenyon, Linderoth, Macduff, Meriam, and Pearsall; Associate Professors Clark, Elsevier, and Murray (Adjunct); Assistant Professors Buzzard, Shepard, Werner and Wright

ME 202. *Theoretical Thermodynamics*. Classical thermodynamics and thermodynamics continuum properties for real substances, equilibrium, introduction to statistical thermodynamics. 3 units. *Elsevier and Harman*

ME 203. *Introduction to Advanced Mechanics*. A comprehensive introduction to advanced theory and application in advanced mechanics with emphasis on stability, space kinematics, and kinetics of particles and rigid bodies, generalized motion equations for constant and time-dependent mass systems, and generalized coordinates. 3 units. *Macduff and Meriam*

ME 211. *Theoretical and Applied Polymer Science*. An advanced course in materials science and engineering, dealing specifically with the structure and properties of polymers. Particular attention is paid to recent developments in the processing and use of modern plastics and fibers. Product design is considered in terms of polymer structures, processing techniques, and properties. 3 units. *Pearsall*

ME 214. *Environmental Factors in Materials Applications*. An advanced treatment of the effects of extreme environments on the design and selection of modern engineering alloys. Microstructural aspects of diffusion, thermal fatigue, creep, oxidation, hot corrosion, and stress-corrosion. Particular attention will be paid to nickel-base and iron-base superalloys, refractory metals, titanium alloys, and composite materials. Prerequisite: ME 111 or permission of the instructor. 3 units. *Shepard*

ME 221. *Compressible Fluid Flow*. The concepts and analysis for flow of gases in subsonic to hypersonic regime. Two-dimensional flow; oblique shocks; experimental techniques. 3 units. *Harman and Werner*

ME 222. *Heat Transfer*. Steady-state and transient solutions of the general heat conduction equation. Development of the equations for transport of energy by fluid motion. Principle of similarity and dimensional analysis in convective energy transport. Solutions of the boundary layer equations. The laws of radiation heat transfer and radiation heat exchange. 3 units. *Chaddock and Werner*

ME 226. *Intermediate Fluid Mechanics*. A survey of the principal concepts and equations of fluid mechanics. Fluid properties. Statics. Basic equations for the control volume. The differential equations of fluid motion. Stream function. Irrotational flow. Navier-Stokes equations. Kelvin's and Crocco's theorem. Applications to two-dimensional incompressible potential flow and to viscous flow in boundary layers. 3 units. *Buzzard*

ME 231. *Systems Response and Control*. Methods, applicable to design, of obtaining parameters for strength, response, and stability studies of mechanical systems. Analysis of closed loop control systems

with linear transfer functions; electrical and mechanical analogs; introduction to determination of transfer function from input-output characteristics. 3 units. *Macduff and Wright*

ME 233. *Fluid Control Systems*. A design oriented course concerned with hydraulic and pneumatic feedback control systems. Basic control system characteristics; linearized transfer functions; determination of transfer function from computation and experiment; position, velocity, and acceleration feedback devices; transducers; DC and AC hydraulic and pneumatic amplifiers. 3 units. *Macduff*

ME 235. *Advanced Mechanical Vibrations*. Analytical and experimental procedures applied to design of machines and systems for adequate vibration control. Determination of eigenvalues and eigenvectors by iteration and computer techniques; transfer matrices applied to lumped and distributed systems; analytical and numerical methods of obtaining the pulse response of plane and three dimensional multi-mass systems; convolution and data processing; introduction to random vibration. 3 units. *Macduff*

ME 251. *Refrigeration and Cryogenics*. Theory and experiment in the evaluation of the thermodynamic properties of refrigerants and cryogenic fluids. Thermodynamics of vapor compression, air cycle, absorption and thermoelectric refrigeration. Production of low and very low temperatures, helium liquifiers. Two-phase flow processes. Heat exchange for refrigeration and cryogenic transfer. 3 units. *Chaddock*

ME 255. *Energy Conversion*. Principles, thermodynamics, and classification of energy conversion devices. Introduction to semi-conductors, thermoelectric generators, photovoltaic generators, thermionic generators, magnetohydrodynamic generators, fuel cells, and other energy conversion devices. 3 units. *Harman*

ME 265. *Advanced Topics in Mechanical Engineering*. Opportunity for study of advanced subjects related to programs within Mechanical Engineering tailored to fit the requirements of a small group. Prerequisites: approval of the Director of Graduate Studies and the instructor under whom work will be done. 1 to 3 units. *Members of the graduate staff*

ME 270. *Theory of Lubrication and Bearing Design*. A study and analysis of the theory of hydrodynamic and hydrostatic lubrication will be presented. The dynamics of bearing loading, bearing design and materials will be examined in their relationships to the theory of lubrication. Properties of lubricants will be reviewed. The student will have ample opportunity to put theory into practice with real bearing problems taken from industrial machinery, construction equipment, transportation media and wherever relative motion is required between adjacent surfaces. 3 units. *Linderoth*

ME 280. *Nuclear Reactor Power Cycles*. Basic reactor principles and types. Examination of most feasible thermodynamic cycles for use with

both stationary and mobile power plants. Consideration of safety shielding, heat transfer, fluid flow and materials problems unique to reactor design. 3 units. *Kenyon*

ME 302. *Advanced Thermodynamics*. Classical thermodynamics of inherently irreversible processes. Statistical thermodynamic analysis of properties of real substances and processes. Principles of general thermodynamics. 3 units. *Harman*

ME 311. *Behavior of Crystalline Solids*. An advanced treatment of the dependence of structure on atomic bonding, and of properties on structure in crystalline solids. Crystal structures; phase diagrams and solid-state thermodynamics; physical properties; mechanical properties; kinetics of thermal treatments. 3 units. *Pearsall and Shepard*

ME 322. *Mechanics of Viscous Fluids*. Development of the boundary layer simplifications. Analysis of the laminar incompressible hydrodynamic and thermal boundary layers. Nonsteady incompressible boundary layers. An introduction to compressible boundary layers. The origin of turbulence. 3 units. *Buzzard*

ME 323. *Convective Heat Transfer*. Models and equations for fluid motion, the general energy equation, and transport properties. Exact, approximate, and boundary layer solutions for laminar flow heat transfer problems. Use of the principle of similarity and analogy in the solution of turbulent flow heat transfer. Two-phase flow, nucleation, boiling, condensation, and simultaneous heat and mass transfer. Prerequisites: Math 285, ME 222 or equivalent. 3 units. *Chaddock*

ME 324. *Conduction and Radiation Heat Transfer*. Conduction heat transfer in steady and transient state. Radiation exchange involving absorbing and emitting media including gases and flames, combined conduction and radiation and combined convection and radiation. Exact and approximate methods of solution including separation of variables, transform calculus, numerical procedures, and integral and variational methods. Prerequisites: Math 285, ME 222, or equivalent. 3 units. *Werner*

ME 331. *Nonlinear Control Systems*. Design of controls for inherently nonlinear systems and the solution of control problems by introduction of nonlinear elements. Stability and optimization. Describing functions and phase-plane techniques for design of nonlinear systems. Parameter analysis. Computer solutions for signal stabilization. Prerequisite: EE 222 or permission of instructor. *Wright*

ME 335. *Analytic Methods in Vibrations*. Time and frequency domain analysis, generalized coordinates and La Grange's equations, natural modes of continuous systems, approximate methods, damped systems, introduction to random vibrations. Prerequisite: ME 235 or permission of instructor. *Wright*

ME 372. *Finite Element Techniques in Design*. Finite element methods applied to design problems in stress analysis; temperature distribution; and flow problems. Derivation of state vectors and transfer matrices

for rectangular and triangular elements; accuracy and computation methods; comparison with difference equation methods and available analytical results. 3 units. *Macduff*

ME 399. *Special Readings in Mechanical Engineering*. Special individual readings in a specified area of study in mechanical engineering. Prerequisite: approval of the Director of Graduate Studies. 1 to 3 units. *Members of the Graduate Staff*

Required Non-Engineering Courses

Chem 1. *General Inorganic Chemistry*. Lectures and recitations on the elementary principles of chemistry and on the structure, properties, preparation and uses of the elements and their compounds. The laboratory work includes qualitative analysis of some of the more common metals. Two lectures, one recitation, and three laboratory hours. Prerequisite: qualification for Math 31. One course.

Engl 1. *Freshman Composition*. Weekly expository themes based on British and American prose fiction and non-fiction; one general lecture, one section meeting, and one individual conference each week. One course.

Math 31, 32. *Introductory Mathematical Analysis*. Language of logic and sets, elementary and transcendental functions, continuity, differentiation, integration, the fundamental theorem of the calculus, sequences, series, Taylor's formula. Prerequisite: three units of college preparatory mathematics. Mathematics 31 is prerequisite to Mathematics 32. Two courses.

Math 73, 74. *Linear Algebra and Intermediate Mathematical Analysis*. Real and complex vector spaces, linear transformations and matrix representations, similarity of matrices, determinants, quadratic forms, partial differentiation, functions defined implicitly, multiple integrals, infinite series, linear differential equations. Prerequisite: Mathematics 32 for 73, and Mathematics 73 for 74. Two courses.

Phys 51-52. *General Physics*. Basic principles of general physics treated more quantitatively than Physics 1-2. Designed for students entering medicine, engineering, and the sciences. Not open for credit to students who have completed Physics 1-2 or 41-42. Three lecture-recitations and one three-hour laboratory period each week. Prerequisites: Mathematics 31, 32 or equivalent (may be taken concurrently). Two courses.

Mathematics Courses for Graduate Students

221, 222. *Numerical Analysis*. Numerical calculus, solution of ordinary and partial differential equations, solution of systems of linear and non-

linear algebraic equations, eigenvalue problems, linear programming and least squares techniques. Prerequisite: a knowledge of computer programming and Mathematics 63 or 74 for 221, and 221 for 222. Two courses. *Patrick*

283. *Applied Mathematical Statistics*. Basic probability concepts, the sample space, discrete and continuous events, permutations and combinations, conditional and marginal probability, discrete and continuous distributions, expected values and moments, sampling distributions, estimation, hypothesis testing, confidence intervals, basic queuing theory. Prerequisite: Mathematics 64. 3 units. *Herr*

284. *Least Squares Analysis of Linear Models*. General linear models; geometrical interpretations; multiple regression; one-way and multi-way analysis of variance; fixed, random, and mixed models; experimental design models; analysis of covariance; introduction to non-linear models. Prerequisite: Mathematics 136 or 283. 3 units. *Burdick*

285. *Applied Mathematical Methods I*. Vectors, line and surface integrals, tensors, complex variables, differential and integral equations. Prerequisite: Mathematics 63. 3 units. *Dankel and Dressel*

286. *Applied Mathematical Methods II*. Wave equation, Fourier series, heat equation, telegraphic equations, Legendre polynomials, Bessel functions, Schrödinger's equation. Prerequisite: Mathematics 63. 3 units. *Dankel and Dressel*

289. *Applications of Stochastic Processes I*. Recurrent events, random walk, Markov chains and processes, queuing theory, branching and diffusion processes. Prerequisites: Mathematics 135 and 140, or consent of the instructor. 3 units. *Wilkinson*

290. *Applications of Stochastic Processes II*. Linear operators, spectral representations, time series, multivariate analysis, auto-regressive schemes, Gaussian processes, cross-correlation functions, smoothing, filtering, prediction, Wiener-Hopf equation, diffusion processes, Fokker-Planck equation, first-passage times. Prerequisite: Mathematics 289 or consent of the instructor. 3 units. *Wilkinson*

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BULLETIN OF DUKE UNIVERSITY

Divinity School

1970



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1970-1971

Durham, North Carolina 1970

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Calendar of the Divinity School

1970

September

- 14 Monday—Dormitories open for occupancy
- 15 Tuesday—Junior Orientation begins
- 16 Wednesday, 9:00-12:00—Meetings of juniors; 2:00-4:00, Testing of juniors, Theological School Inventory and Minnesota Multiphasic Personality Inventory
- 17 Thursday, 9:00-1:00—Registration of returning students, photographing of new students, group meetings of juniors with advisers; 2:00-5:00 p.m.—registration of juniors and all other new students
- 18 Friday, 9:00-1:00—Continuation of registration, continuation of Orientation Program, Library tours, other meetings
- 21 Monday—Fall semester classes begin
- 22 Tuesday, 10:00 a.m.—Divinity School Opening Convocation
- 25 Friday—Last day for changing courses for the fall semester

October

- 26-28 Monday-Wednesday—The Divinity School Convocation and Pastors' School with Gray Lectures

November

- 25 Wednesday, 12:30 p.m.—Thanksgiving recess begins
- 30 Monday, 8:00 a.m.—Classes are resumed

December

- 2-3 Wednesday-Thursday—Preregistration for spring semester
- 11 Friday—Founders' Day
- 18 Friday, 5:30 p.m.—Christmas recess begins

1971

January

- 4 Monday, 8:00 a.m.—Classes are resumed
- 11-12 Monday-Tuesday—Registration of returning students for spring semester
- 15 Friday—Fall semester classes end
- 18-20 Monday-Wednesday—Reading Period
- 21 Thursday—Final examinations begin
- 29 Friday—Final examinations end

February

- 4 Thursday—Registration of new students
- 8 Monday—Spring semester classes begin
- 12 Friday—Last day for changing courses

March

- 26 Friday, 5:30 p.m.—Spring recess begins

April

- 5 Monday, 8:00 a.m.—Classes are resumed
- 28 Wednesday, 12:00 noon—Dean's luncheon for senior class

May

- 3-4 Monday-Tuesday—Preregistration for fall semester
- 19 Wednesday, 10:00 a.m.—Divinity School Closing Convocation
- 20 Thursday—Spring semester classes end
- 24 Monday—Final examinations begin

June

- 2 Wednesday—Final examinations end
- 5 Saturday—Commencement begins
- 6 Sunday, 11:00 a.m.—University Baccalaureate service
- 6 Sunday, 7:45 p.m.—Divinity School Baccalaureate service
- 7 Monday—Commencement

Officers of Administration

General Administration

Terry Sanford, J.D., LL.D., L.H.D., D.P.A., *President*
A. Kenneth Pye, LL.M., *Chancellor*
John O. Blackburn, Ph.D., *Provost*
Charles B. Huestis, *Vice President for Business and Finance*
William G. Anlyan, M.D., *Vice President for Health Affairs*
Frank Leon Ashmore, A.B., *Vice President for Institutional Advancement*
Gerhard Chester Henriksen, M.A., C.P.A., *Vice President and Treasurer*
Everett Harold Hopkins, LL.D., *Vice President for Regional Programs*
Harold W. Lewis, Ph.D., *Vice Provost and Dean of the Faculty*
John C. McKinney, Ph.D., *Vice Provost and Dean of the Graduate School*
James L. Price, Ph.D., *Vice Provost and Dean of Undergraduate Education*
Craufurd D. Goodwin, Ph.D., *Vice Provost and Director of International Programs*
Benjamin Edward Powell, Ph.D., *Librarian*
Clark R. Cahow, Ph.D., *University Registrar*
Victor A. Bubas, B.S., *Assistant to the President*
Rufus H. Powell, LL.B., *Secretary of the University*
Stephen Cannada Harward, A.B., C.P.A., *Assistant Secretary and Assistant Treasurer*
Edwin Constant Bryson, LL.B., *University Counsel*

Educational Administration of the Divinity School

Robert E. Cushman (1945), B.D., Ph.D., L.H.D., *Dean of the Divinity School*
Osmond Kelly Ingram (1959), B.D., *Director of Field Education*
Robert Terry Young (1970), *Assistant Dean for Admissions and Student Affairs*
Fletcher Nelson (1964), B.D., D.D., *Assistant to the Dean for Development*
Helen Mildred Kendall (1950), A.B., *Administrative Assistant and Registrar*
Shirley O'Neal (1966), *Administrative Assistant for General Administration and Finance*
William C. Simpson (1969), B.D., *Assistant Director of Field Work Placement*

Division of Advanced Studies

Waldo Beach (1946), B.D., Ph.D., *Supervisor, Master of Theology Program*

Franklin W. Young (1968), B.D., Ph.D., *Director of Graduate Studies in Religion*

Division of Special Studies

Richard A. Goodling (1959), B.D., Ph.D., *Director, Programs in Pastoral Psychology*

P. Wesley Aitken (1963), B.D., Th.M., *Director, Clinical Pastoral Education*

William Arthur Kale (1952), B.D., D.D., *Director, the Master of Religious Education Program*

Stuart C. Henry (1959), B.D., Ph.D., *Supervisor, Honors Program*

Library

Donn Michael Farris (1950), B.D., M.S. in L.S., *Librarian*

Harriet V. Leonard (1960), B.D., M.S. in L.S., *Reference Librarian*

Mary Finnin, *Circulation Librarian*

Pamela Petrich, *Assistant Circulation Librarian*

Secretarial Staff

Bonnie F. Belk, *Secretary to the Director of Field Education*

Mary P. Chestnut, *Faculty Secretary*

Vivian P. Crumpler, *Faculty Secretary*

Rose Marie Davis, A.B., *Secretary to the Director of Graduate Studies in Religion*

Clara S. Godwin, *Secretary to the Dean*

Rita Gresham, *Faculty Secretary*

Patricia M. Haugg, *Faculty Secretary*

Maxie B. Honeycutt, *Administrative Secretary for Student Financial Aid*

Joan F. Lunsford, *Secretary to the Registrar*

Linda S. McFalls, *Secretary to the Assistant Dean*

Sandra R. Smith, *Faculty Secretary*

Faculty

Frank Baker (1960), B.D., Ph.D., *Professor of English Church History*

Waldo Beach (1946), B.D., Ph.D., *Professor of Christian Ethics*

Robert E. Cushman (1945), B.D., Ph.D., L.H.D., *Professor of Systematic Theology*

*William David Davies (1966), M.A., D.D., F.B.A., *George Washington Ivey Professor of Advanced Studies and Research in Christian Origins*

James Michael Efird (1962), B.D., Ph.D., *Associate Professor of Biblical Languages and Interpretation*

Donn Michael Farris (1950), B.D., M.S. in L.S., *Associate Professor of Theological Bibliography*

Richard A. Goodling (1959), B.D., Ph.D., *Professor of Pastoral Psychology*

Thor Hall (1962), B.D., M.R.E., Ph.D., *Associate Professor of Preaching and Theology*

Stuart C. Henry (1959), B.D., Ph.D., *Professor of American Christianity*

Frederick Herzog (1960), Th.D., *Professor of Systematic Theology*

Osmond Kelly Ingram (1959), B.D., *Professor of Parish Ministry*

William Arthur Kale (1952), B.D., D.D., *Professor of Christian Education*

Creighton Lacy (1953), B.D., Ph.D., *Professor of World Christianity*

Paul A. Mickey (1970), B.D., Th.D., *Assistant Professor of Pastoral Theology*

Ray C. Petry (1937), Ph.D., LL.D., *James B. Duke Professor of Church History*

McMurry S. Richey (1954), B.D., Ph.D., *Professor of Theology and Christian Nurture*

Charles K. Robinson (1961), B.D., Ph.D., *Associate Professor of Philosophical Theology*

John Jesse Rudin, II (1945), B.D., A.M., Ph.D., *Associate Professor of Christian Communications*

*On sabbatical leave, spring semester, 1971.

- *Dwight Moody Smith, Jr. (1965), B.D., M.A., Ph.D., *Professor of New Testament Interpretation*
 Harmon L. Smith (1962), B.D., Ph.D., *Associate Professor of Moral Theology*
 William Franklin Stinespring (1936), M.A., Ph.D., *Professor of Old Testament and Semitics*
 Robert L. Wilson (1970), B.D., M.A., Ph.D., *Professor of Church and Society*
 Franklin Woodrow Young (1968), B.D., Ph.D., *Amos Ragan Kearns Professor of New Testament and Patristic Studies*

Visiting Faculty

- Wilhelm Pauck (1970), Dr.Theol., *Visiting Professor of Historical Theology*
 R. B. Y. Scott (1970), M.A., B.D., Ph.D., *Visiting Professor of Old Testament*
 George H. Shriver (1970), B.D., Ph.D., *Visiting Professor of Church History*

Associates in Instruction

- P. Wesley Aitken (1963), B.D., Th.M., *Chaplain Supervisor, Duke Medical Center and Part-time Assistant Professor of Clinical Pastoral Education of the Divinity School*
 John William Carlton (1969), B.D., Ph.D., *Adjunct Professor of Preaching*
 Philip R. Cousin (1969), S.T.B., *Lecturer in Church and Society*
 John C. Detwiler (1966), B.D., Th.M., *Chaplain Supervisor, Duke Medical Center and Instructor in Clinical Pastoral Education*
 John C. Fletcher (1968), B.D., *Lecturer in Church and Society, Assistant Professor of Church and Society, Virginia Theological Seminary*
 John Kennedy Hanks (1954), M.A., *Lecturer in Sacred Music and Director of the Divinity School Choir, Professor of Music, Duke University*
 Lorenzo A. Lynch (1969), B.D., *Visiting Lecturer in the Urban Church*
 M. Wilson Nesbitt (1958), B.D., D.D., *Adjunct Professor of the Work of the Rural Church*
 Harry B. Partin (1964), B.D., Ph.D., *Lecturer in History of Religions, Assistant Professor of Religion, Duke University*
 William Hardman Poteat (1960), B.D., Ph.D., *Lecturer in Christianity and Culture, Professor of Religion, Duke University*
 William C. Spong (1965), B.D., Th.M., *Chaplain Supervisor, Duke Medical Center, and Instructor in Clinical Pastoral Education*
 Orval Wintermute (1959), B.D., Ph.D., *Lecturer in Old Testament, Associate Professor of Religion, Duke University*

*Sabbatical leave, 1970-71.

Teaching Assistants

- James A. Dumke (1970), B.D., *Teaching Assistant in New Testament Greek*
- Thomas Hoyt, Jr. (1969), B.D., S.T.M., *Teaching Assistant in New Testament*
- Clifford A. Armour (1969), S.T.B., *Teaching Assistant in Old Testament*
- John T. Ames (1969), B.D., *Teaching Assistant in Church History*
- Donald E. Byrne (1969), M.A., *Teaching Assistant in Church History*
- B. Maurice Ritchie (1969), B.D., Th.M., *Teaching Assistant in Church History*
- Gerald A. Butler (1970), B.D., *Teaching Assistant in Theology*
- Daniel L. Durway (1970), B.D., *Teaching Assistant in Theology*
- John C. Harris (1970), M.Div., *Teaching Assistant in Theology*
- Robert E. Dowda (1970), B.D., Th.M., *Teaching Assistant in New Testament*
- John W. Wilson (1970), B.D., S.T.M., *Teaching Assistant in Old Testament*

Emeriti

- Kenneth Willis Clark (1931), B.D., Ph.D., D.D., *Professor Emeritus of New Testament and Co-Director of the International Greek New Testament Project*
- James T. Cleland (1945), M.A., S.T.M., Th.D., D.D., *James B. Duke Professor Emeritus of Preaching*
- Hiram Earl Myers (1926), S.T.M., D.D., *Professor Emeritus of Biblical Literature*
- H. Shelton Smith (1931), Ph.D., D.D., Litt.D., *James B. Duke Professor Emeritus of American Religious Thought*
- Hersey Everett Spence (1918), A.M., B.D., D.D., Litt.D., *Professor Emeritus of Religious Education*
- Arley John Walton (1948), B.S.L., D.D., *Professor Emeritus of Church Administration and Director of Field Work*

Divinity School Councils and Committees

Faculty Executive Council

Cushman, *ex officio*. Representatives: Henry, Kale, Lacy, F. Young;
Members-at-Large: Beach (1), Goodling (2), Richey (3), Efird (3),
Hall (1); Student Association Executive Committee, Consultants.

Administrative Committees

Academic Standing: Cushman, *ex officio*; Cousin, Farris, Beach, Efird,
Henry, Ingram, Kale, Kendall, H. Smith, R. Young

Admissions: Cushman, *ex officio*; Beach, Efird, Hall, Ingram, Kale,
Mickey, Richey, R. Young, 2 Student Representatives II

Alumni Affairs: R. Young, Kale, Nelson

Convocation: Richey, *ex officio*

Field Work Placement: Ingram, *ex officio*; Simpson, R. Young

Library: Farris, *ex officio*; Baker, Hall, Petry, Student Representative II

Ministerial and Professional Qualifications (Judiciary): R. Young, Mickey,
Richey, 3 Student Representatives II

Registration and Advanced Standing: Stinespring, Efird, Kendall, R. Young

Student Financial Aid: Cushman, *ex officio*; Beach, Honeycutt, Ingram,
O'Neal, R. Young, 2 Student Consultants

Educational Affairs Council

Cushman, *ex officio*; Representatives: Henry, Kale, Lacy, F. Young, *ex officio*; Beach, Efird, Farris, Goodling, Ingram, R. Young; Members-at-Large: Richey (1), Rudin (1), Stinespring (1), 4 Student Representatives II

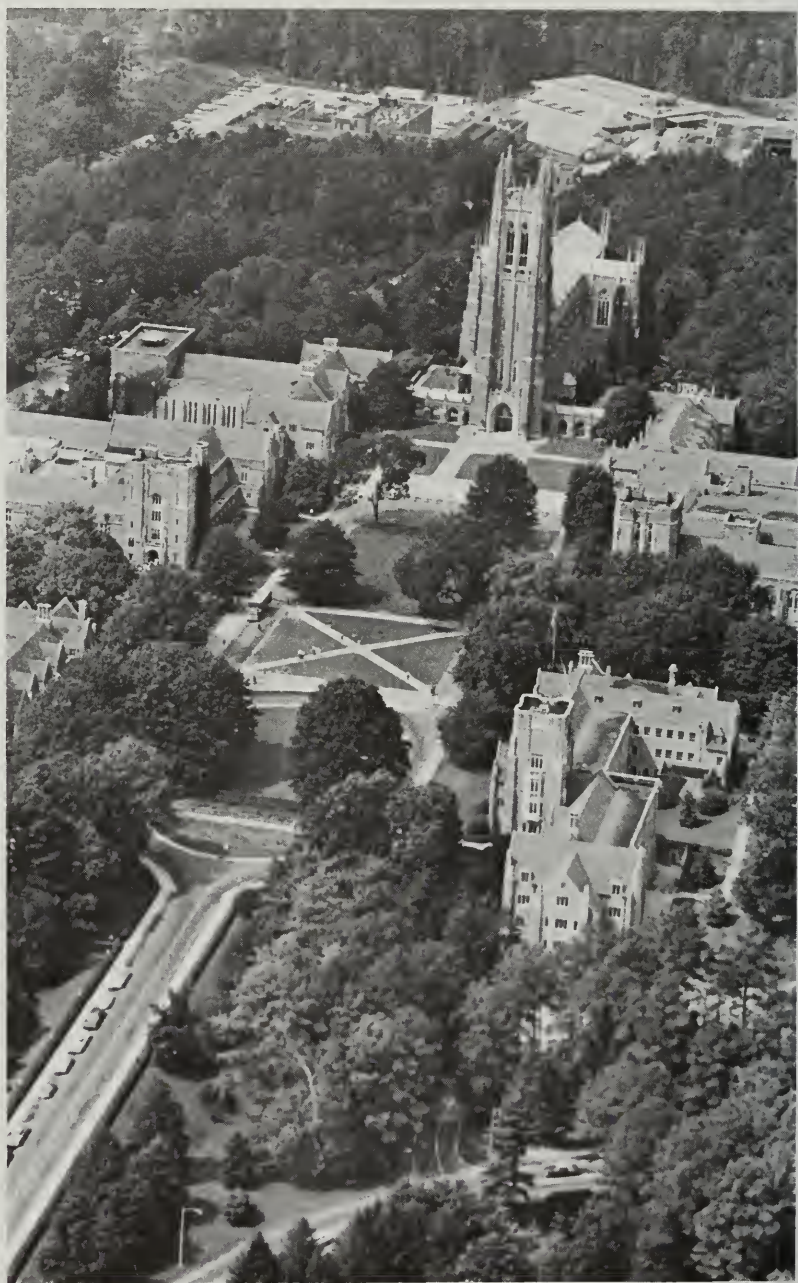
Academic Program Committees

Academic Advisers: Efird, Baker, Goodling, Hall, Henry, Herzog, Ingram,
Kale, Lacy, Mickey, Petry, Richey, Robinson, Rudin, H. Smith, Wilson,
2 Student Representatives II

Curriculum: Richey, Rudin, Stinespring, 2 Student Representatives II
Colloquium: Aitken, Staff
Continuing Education: Henry, Nelson, Nesbitt, Rudin, R. Young
Field Education Supervision: Ingram, Simpson, President of DESA *ex officio*, 1 Student Representative II
Honors Program Supervision: Henry, Aitken, Mickey, Stinespring, 1 Student Representative II
Master of Theology Supervision: Beach, Goodling, Petry, Wilson
Ministering-in-Context Supervision: Ingram, Robinson, Rudin, 1 Student Representative II
Religious Education Supervision: Kale, Richey, 1 Student Representative II

Joint and Special Committees

Chapel Worship: Kale, Hall, Kendall, Mickey, H. Smith; Rudin, *Worship Program Director*; Student Committee
Christian Social Concerns: Herzog, Richey, H. Smith, R. Young, 2 Student Representatives II
Divinity School Review: Richey, Baker, Farris, Petry, Robinson, Wilson, 1 Student Representative II
Lectures and Public Events: Hall, Davies, Goodling, Herzog, Richey, F. Young, 2 Student Representatives II
James A. Gray Lectures: Cushman, Davies, Hall, 1 Student Representative II
Divinity School Seminars: Kale, Hall
Missions Symposium: Lacy, Student Committee II
Assemblies: R. Young, Student Committee II
 A quorum shall consist of two-thirds membership present and voting.



General Information

Historical Statement

The Indenture of Trust signed on December 11, 1924, by Mr. James B. Duke, which established Duke University, mentioned first among its objects the training of ministers of the Gospel. The Divinity School was, accordingly, the first of the graduate professional schools to be organized. Its work began with the year 1926-1927, the formal opening exercises being held on November 9, 1926.

The Reverend Doctor Edmund Davison Soper was the first Dean of the Divinity School. He resigned in 1928 to become President of Ohio Wesleyan University, and was succeeded by the Reverend Doctor Elbert Russell, who was then succeeded in 1941 by the Reverend Doctor Paul Neff Garber. In 1944, Dean Garber was elected to the episcopacy of The Methodist Church, and Doctor Harvie Branscomb assumed the duties of the Dean's office. In 1946, Dean Branscomb became Chancellor of Vanderbilt University, and in 1947 the Reverend Doctor Paul E. Root was elected Dean but died before he could assume office. The Reverend Doctor Harold A. Bosley became Dean in 1947 and resigned in 1950 to become the pastor of the First Methodist Church, Evanston, Ill. The Reverend Doctor James Cannon was appointed Dean of the Divinity School, March 1, 1951. After a period marked by important administrative integration of the School, Doctor Cannon resigned the duties of Deanship, September 30, 1958. The Reverend Professor Robert Earl

Cushman was elected Dean and assumed the responsibilities of the office on October 1, 1958.

The Role of the Divinity School

The Divinity School represents theological inquiry and learning within the greater University. By history and indenture, it stands squarely within the Christian tradition and recognizes its distinctive lineage in, as well as a continuing obligation toward, the United Methodist Church. It has been from its inception ecumenical in aspiration, teaching, and practice. Ecumenical also is the actual membership of its faculty. Educational policy has consistently aspired to nurture a Christian understanding "truly catholic, truly evangelical, and truly reformed."

The presiding purpose of the Divinity School is education for ministry. Ministry in Christ's name to the world increasingly assumes manifold forms. Provision for these variations of ministry is expressly supplied in the curricular resources of the School. However, while the conventional and inherited styles of ministry are now certainly undergoing change, the Divinity School curriculum continues to prepare students for informed and discriminating discharge of the historic offices of church and congregation through the ministry of Word and Sacrament, pastoral care, and the teaching office. Whatever form or context "the local church" of tomorrow may assume, Divinity School education remains predicated upon the historically grounded probability that these offices will remain.

Under the guidance of this perspective, the Divinity School aspires to prepare adequately qualified students for mature espousal of their vocation, with disciplined intelligence informed by sound learning, and equipped for worthy professional service. This is regarded as a service to the Church, to the world, and, pre-eminently, to the Lord of the Church.

Education for Ministry

The Divinity School receives students from many Christian denominations and aspires to offer its educational resources to representatives of all communions who seek education for ministry. The aim of the school is not general but professional education for a Christian ministry. Its resources are offered to qualified students with vocational aims commensurate with those of the School. While the student body is one of diversity of ministerial aims, the School seeks by recruitment and financial support to be responsive to the major continuing needs for the sound

preparation of persons for ordination or lay professional vocations of the churches.

The Relation of the Divinity School to Duke University

The Divinity School is an integral part of the University and shares fully in its activities, privileges, and responsibilities. The Sunday services in the University Chapel give Divinity School students an opportunity to hear each year a number of leading ministers of the country. The University libraries make easily accessible a rich collection of more than 2,100,000 volumes. Selected courses in the Graduate School and in the professional schools are open to Divinity School students without payment of additional fees. The general, cultural, and recreational resources of the University are available to them on the same basis as to other students.



Architectural rendering of Divinity School addition.

Courses of Study and Requirements for Degrees

Degree Programs

The academic work of the Divinity School embraces three degree programs. These are the basic degree programs ordinarily of three academic years, leading to the Master of Divinity degree (M.Div.); a one-year program beyond the basic degree, the Master of Theology (Th.M.); and a third program of two academic years leading to the degree of Master of Religious Education (M.R.E.). All are graduate-professional degrees. Admission to candidacy for the Master of Divinity and Master of Religious Education degrees presupposes the completion of the A.B. or its equivalent.

Students preparing for ordination to the Christian ministry, and requiring appropriate graduate-professional education, will regularly enroll for the Master of Divinity degree. Students whose acquired academic standing, under this basic degree program, entitles them to further specialized study may advance their command of selected theological disciplines by applying for an additional year of studies leading to the Master of Theology degree. Together, these two degree programs constitute a sequence. Although the Master of Divinity degree fulfills re-

quirements for ordination by prevailing ecclesiastical standards, the Th.M. program may assist in assuring a larger measure of professional preparation. Application for admission to the Th.M. program is open to graduates of other schools who have completed the basic theological degree.

The Master of Religious Education program is designed to prepare qualified persons, ordinarily not seeking ordination, for a ministry of Christian education in local churches or other contexts. The course of study is arranged to provide grounding in Biblical, historical, and theological disciplines as essential background for instruction in and exercise of professional competence in curricular planning, teaching methods, and supervision of educational programs for various age groups.

The specific requirements for each of these degrees are found in the succeeding pages. It is evident that completed course work cannot be credited toward more than one degree. Reciprocal transfer of credit for course work taken under either the M.Div. or the M.R.E. program requires the permission of the Dean.

Doctoral Studies Accredited by the Graduate School

The Divinity School provides a substantial body of course offerings at an advanced level in Biblical, historical, and systematic and contemporary theological disciplines that are accredited alike by the Graduate School and the faculty of the Divinity School, and lead to the Doctor of Philosophy degree. Sharing responsibility with the University Department of Religion for staffing and curricular provision of this course of study, the Divinity School is the principal contributor to the program of graduate studies in religion. However, since the Ph.D. in religion is certified and awarded under the Graduate School, the doctoral student's admission and matriculation are administered under that division of Duke University.

With few exceptions, most courses in the *Bulletin of the Divinity School* carrying a "200" number or above and belonging to the fields noted above are applicable to doctoral programs of study.

Qualified persons who desire to pursue studies leading to the degrees of M.A. or Ph.D. in religion, under the administration of the Graduate School, are advised to apply to the Dean of that School. Inquiries concerning fellowships or specific requirements of the Program of Graduate Studies in Religion may be addressed to Professor Franklin W. Young, Director, 209 Divinity School.

The Basic Theological Degree—Master of Divinity

Recent Curricular Revision

In 1948 a greatly altered curriculum, providing for both vocational differentiation and area concentration in student programs, was introduced and was in force until 1959 when further alterations and articulations of that program were instituted.

Recently, after extensive study, a revised curriculum leading to the basic theological degree was provisionally instituted in the fall of 1967 as subject to further emendations. It was published in the 1968 *Bulletin*. Thereafter, an authorized committee of the faculty, pursuing certain lines of the 1967 program, but empowered to raise prior questions concerning the aims and goals of timely theological education in a university context, submitted its preliminary report in the fall of 1968 to the faculty and the authorized committee of the Co-ordinating Council for scrutiny and suggestions. After full assessment of the bearing of all commentary criticism, the presently offered program of studies leading to the Master of Divinity degree was adopted by faculty action January 22, 1969, and is herewith published. Under this program, and until it may be further altered by due process, students matriculating for the Master of Divinity degree at Duke University are expected, as a condition of admission, to formulate and pursue their theological education.

Having undertaken and effected major curricular alteration and updating four times in two decades, the Divinity School and its faculty believes it has shown itself not insensitive to the need for change in a changing society. It is now the judgment of the faculty and the Dean that any curriculum is only a more or less adequate vehicle of unavoidably multiple educational purposes that are not fully capable of harmonization, and that, in the end, fruitful education must depend upon student and faculty mutuality, utilization of resources, diligent application, and positive motivation, as well as good will.

The currently published basic degree program is, in sum, the resultant of earnest and searching consultation and inquiry extending through the years 1965-1969. New directions of critical reflection represented by the Bridston-Culver report, the Fielding Report, the AATS "Task Force" recommendations, the Sewanee Consultation, together with attention to numerous developments in sister institutions have strongly contributed to the present curricular program. It seeks to be a positive response to (1) the challenge to provide an adequate "professional" education, "education for ministry;" (2) needed variability of ministries in today's world; (3) the norms of university education; and (4) the perennial summons of the abiding Christian tradition.

Finally, the basic degree program became effective in the fall semester, 1969, for all students other than seniors graduating in June, 1970.

Aims of the Curriculum

The aims of the basic degree program focus upon four goals, four areas of personal and curricular responsibility also deemed to be four life-long tasks which should be strongly advanced during the seminary years:

1. *The Christian Tradition*—acquiring a basic understanding of the Biblical, historical, and theological heritage;

2. *Self-Understanding*—progress in personal and professional maturity—personal identity, life style as an instrument of ministry, major drives, handling of conflict, resources, professional competency, and so forth, coupled with a sensitivity to the world in which we minister—its social forces, its power structures, its potential for humanization—and dehumanization;

3. *Thinking Theologically*—ability to reflect about major theological and social issues, to define current issues in theological terms and theological issues in contemporary secular terms;

4. *Ministering in Context*—ability to conceptualize and participate effectively in some contemporary ministry.

Obviously goals of such scope cannot be neatly programmed in any curriculum, and the degree of achievement (in seminary and beyond) will vary widely with the individual and his own motives and incentives.

The Basic Curriculum—General Description

The basic curriculum leading to the Master of Divinity degree provides for foundational courses in Biblical, historical, theological, and ministry studies, representative of the tradition and regarded as indispensable background for subsequent elective work and individual program formation.

These required courses total twenty-three (23) of the seventy-five (75) semester hours necessary for graduation. The opportunity of advanced standing adds further variability to the academic program of the junior student, depending upon the nature and quality of his undergraduate academic work.

Required courses may be staffed by one or more professors and are planned to treat the subject matter both in scope and depth at the graduate level.

The Ministry Seminars of the first and second semesters of the junior year are intentionally introductory to their field and subject, offer experience in group learning, and are optional for all entering students. A Junior Colloquium I is required, carries no credit, and offers enriching experience in group dynamics and self-understanding.

One elective course is available in each semester of the junior year and may be utilized for language study in either Greek or Hebrew or other Biblical language as the student may be qualified. A total of fifty-one

(51) semester hours are available for the working out of the students' individualized program of studies leading to specialized preparation in academic depth and for purposes of professional ministerial competence.

The formulation of the student's course of studies is guided by (a) certain broad but normative recommendations for area distribution of courses and (b) the advice and counsel of appointed faculty advisers or authorized directors.

All academic programs are subject to the review of the academic officials of the School. The declared vocational and professional objective of the student is of central importance both to the student and his faculty adviser in planning the student's comprehensive study program.

Six semesters of residential study are ordinarily required for the completion of the degree. On permission of the Dean certified nonresidential study, not exceeding the equivalent of twenty-four (24) semester hours, may be permitted to a candidate for the basic degree.

The normal course load per semester is twelve (12) or thirteen (13) semester hours. The delimitation of the semester course-hour load and the total credit hour requirement for graduation entitles both student and instructor to expectations of substantial student investment and accomplishment in individual courses. The emphasis of the new curriculum, like that of the preceding one, is upon depth and competence rather than upon excessive scope.

General Features of the Basic Curriculum—A Summary

A total requirement of 75 semester hours for graduation.

A normal academic load of four courses with credit.

Junior Seminars in the fall and spring semesters of the first year (optional) and a Colloquium I required in the fall semester. Students entering in the spring semester will take Colloquium I in the fall semester following.

Special allowances: up to three semester hours of credit for Field Education projects under faculty supervision; up to six semester hours credit for independent study; up to six semester hours clinical or internship credit; up to six semester hours of cognate studies in the Graduate School of Duke University with the permission of the student's adviser and the Dean.

Planned distribution of studies to include representative areas of the curriculum guided by professional aims, with concentration in any one subdivision of the curriculum of not more than five advanced courses.

Field education: an approved assignment in field education under supervision. (See General Field Education Requirement.)

The Ministering-in-Context program (optional) will be available as an elective option to students in the regular course of study. Students in the Honors Program will not be eligible.

It presupposes an approved and supervised field education project in specialized settings, with accompanying guided research, project paper, and faculty evaluation, six semester hours credit in the senior year.

General Academic Program

Master Schedule

The Curricular Paradigm

Junior Year

<i>Fall Semester</i>	<i>s.h.</i>	<i>Spring Semester</i>	<i>s.h.</i>
Old Testament 11 (or OT elective for Advanced Standing) .	4	New Testament 18 (or NT elective for Advanced Standing) .	4
History of Christianity 13, I-II (or CH or HT elective for Advanced Standing)	4*	History of Christianity 14, II-III (or CH or HT elective for Advanced Standing)	4*
Church and Ministry Seminar 9	2†	Person and Society Seminar 10	2†
Colloquium I	0	Elective	3
Elective	3		
Total	13	Total	13

*Year-sequence.
†Optional.

Middler Year

<i>Fall Semester</i>	<i>s.h.</i>	<i>Spring Semester</i>	<i>s.h.</i>
Systematic Theology 32	4	Christian Ethics Introduction 33 .	3
Elective	3	Elective	3
Elective	3	Elective	3
Elective	3	Elective	3
	13		12

Senior Year

<i>Fall Semester</i>	<i>s.h.</i>	<i>Spring Semester</i>	<i>s.h.</i>
Ministering in Context I (optional)	3	Ministering in Context II (optional)	3
Elective	3	Elective	3
Elective	3	Elective	3
Elective	3	Elective	3
	12		12

The Honors Program of the Basic Curriculum

Effective in the fall semester of 1969 a new Honors Program replaced the honors programs of former years.

The program requires 75 semester hours credit leading to the Master of Divinity degree. It is open to students admitted to regular course of study who, in virtue of superior undergraduate record and achievement, give promise of capacity for more rapid advancement toward independent utilization of the resources of curriculum, library, and faculty supervision.

Admission Procedures

A student applying for admission to the Divinity School may apply at the same time for admission to the Honors Program. Procedures and requirements are as follows: (1) The student must submit a *B+* or better undergraduate record. (2) His application will be reviewed by the Faculty Committee on Honors. This committee may require of the student an interview, if necessary, at the time of fall matriculation. (3) He must submit with the application his scores on the Graduate Record Examination or other comparable test scores as the committee may request.

Notice of the action of the committee will not necessarily be coincident with notice of admission to the Divinity School, since two different committee actions are involved and because of the special procedures involving honors applicants noted above. However, with submission of all required credentials, and barring the need of an interview, of which the student would be formally notified, the Honors Program Committee will give notice of action not later than April 15 for applicants who have submitted all credentials prior to March 15. Late applications will be acted upon as promptly as possible.

Admission to the Honors Program at the end of the junior year is provided for and will be contingent upon superior performance in course work (ordinarily at least a *B+* average) and the approval by the Honors Program Committee. Applicants completing their course work of the junior year will apply to the Honors Program Committee, through the admissions officer, not later than July 1 preceding their middler year.

Synopsis of the Honors Program

Junior Year. The junior honors student's program follows the regular academic program for the first and second semesters of residence in the Divinity School.

Middler Year. First semester: The student registers for the required course in Systematic Theology and Christian Ethics Introduction.

Second semester: The student registers for two electives with a minimum of 6 semester hours.

Honors students will employ free time allowed by their schedule for the purpose of independent study in the area of their chosen concentration. At a date set by the Committee on Honors, students stand for a comprehensive examination in a defined area representative of the extent and focus of their independent study. Divisional representatives of the faculty will supply honors students during the first semester of residence with bibliography and advice regarding the limits, requirements, and standards of the comprehensive.

Senior Year. First semester: The student registers for one seminar in the field of his concentration.

Second semester: The student registers for one seminar in the field of his concentration. Before April 15 of his last semester (or December 15 if his sixth semester falls in the autumn term) the student presents an honors paper on a subject appropriate to his area of concentration.

Provisions for advanced standing and for reading out courses apply to honors students where appropriate.

Field Education requirements of the Regular Program apply to students in honors studies. Honors students may in middler and senior years enroll in regular curricular offerings of the Divinity School, and they may participate in Field Education enterprises. They may also enroll for up to six semester hours of cognate studies, additional to designated electives, in the Graduate School of Duke University, with the permission of their adviser and the Honors Program Supervisor.

Administration of the Program

The honors student will be assigned to a faculty member of the Honors Committee with whom consultation will be imperative. His program of studies is subject to review by the Honors Program Committee at the end of each semester to determine his eligibility for continuance in the program. His prospective course of study for each succeeding semester requires the approval of both his faculty adviser and the Supervisor of the Honors Program.

Students in the Honors Program are not required to complete their degrees in three academic years, but they must fulfill at least six semesters of academic residence.

Transcripts and Grades

When it becomes necessary to supply a transcript of grades for honors study, the student will be credited with hours in the divisional fields corresponding to his focus of study. Grades shall be recorded as A when he has, in the judgment of the instructor, performed with distinction or, otherwise, as P. If at any time a student falls below an acceptable level of

performance in the Honors Program, he will be advised to return to study of the regular curriculum. In such case he will have placed upon his record credit for the number of hours which he would normally have acquired at that chronological point in his career had he pursued the normal course of study. Hours will be assigned to divisional areas which correspond to the areas of his independent study. Grades for these hours will be determined by the Honors Committee upon the recommendation of his adviser.

Administration of the Curriculum

General Regulations

1. Full-time students are required to enroll for the required courses of the curriculum or for alternative courses offered for advanced standing in the order provided by the master schedule of the curricular paradigm.

2. Students in programs leading to either the Master of Divinity or Master of Religious Education degree are required at the time of each registration period to plan their course of study with consultation and approval of their assigned faculty advisers.

3. The schedules or academic programs of all students in candidacy for Divinity School degrees will be formulated in consultation with a designated faculty adviser or director. Such programs are subject to review and approval of the Committee on Academic Standing or the Dean.

4. Student Pastors in candidacy for the Master of Divinity degree under any of the three programs of study are advised that their program will normally require a fourth academic year. Modification of this schedule of expectancy will be treated with reserve and will require the express approval of the Dean on recommendation of the Director of Field Education.

a. Students with pastoral charges, or comparable extracurricular responsibilities, will normally enroll for not less than seven (7) nor more than ten (10) semester hours.

b. An entering student desiring to serve as a student pastor must have the approval of the Director of Field Education and must participate in an Orientation and Training Program (see Field Education, pages 41-44).

c. Students who accept pastoral charges in their middler or senior years are required to have the prior approval of the Director of Field Education. Such students will be required to restrict their course work in accordance with the regulation stated above (4a) governing the course load of all student pastors-in-charge.

d. Modifications of these regulations, in the case of individual student pastors, will be scrupulously administered in terms of location of charge and commuting distance, magnitude of assignment, and residence during the academic week. Demonstrated academic achievement will regularly condition any modification of the normal limitation. Since adequate indication of the student's academic proficiency will not be available before the completion of the first academic year, no modification of regulation (4a) for junior students is allowed.

5. Student Assistant Pastors (not pastors-in-charge) may enroll for a full academic load providing: they are not on probation, are under the supervision of the Director of Field Education, and possess field duties involving no more than 15 hours per week.

6. A student in candidacy for the Master of Divinity or Master of Religious Education degree shall enroll for no less than seven (7) semester hours in any semester. Variations from this regulation shall be by approval of the Dean.

7. Study abroad, with transferable credit toward graduation, may be allowed to a candidate for the Master of Divinity degree by approval of the Dean on recommendation of the Assistant Dean. Permission will not be granted in the absence of a strong academic record. Ordinarily, permission for such study may be granted to students who have completed the work of the middler year. Both the institution abroad and a specific course of study proposed must have the prior approval of the chairman of the Registration Committee and the Dean.

8. Transfer of credit to the Divinity School of Duke University, leading to candidacy for the degree of Master of Divinity, ordinarily may not exceed in amount more than one-half of the academic credits (in proportional evaluation) required for fulfillment of degree candidacy (see chapter on Admission, page 36).

9. Special student status may be granted on recommendation of the admissions officer for approval of the Dean. Particular circumstances must prevail in the case of such admissions and will not be honored to permit circumvention of requirements of regular academic programs. Special students are not eligible for tuition or other scholarship grants.

10. Auditing of courses is permitted on notice to the Registrar and by permission of the Dean and the faculty instructor concerned. Auditors, not in regular course of study as candidates for degrees, are subject to a \$31.50 fee by University regulations.

11. Students in candidacy for a degree who secure minor employment outside the channels of the Field Education Office are required to inform the Director of Field Education. Students carrying an outside employment work load of more than 15 hours weekly may be required to limit their academic load.

Curricular Provisions and Procedures

The Order of Sequence in Student Programs. Admission to candidacy for the Master of Divinity degree is admission to regular program of studies. The General Academic Program constitutes the master prospectus and schedule for the basic theological degree. This prospectus defines the normal sequence of the student's developing program. Variations of sequence are excluded save in the instance of students on limited programs, as in the case of student pastors, arranging their studies over four years, or special students.

Mid-Year Matriculation for the Junior Year. Students who matriculate for the second semester of the junior year in January will be responsible for fulfilling requirements of the first semester of the junior year the succeeding fall semester.

Administration of Advanced Standing. The rationale and conditions of advanced standing are provided in the section entitled Admissions. The provision is, in principle, applicable exclusively to required courses.

Beginning with the fall semester, 1970, students qualifying for advanced standing in History of Christianity, I, II, III (13 and 14) which is a year course will fulfill the requirements by electing three courses in historical studies during their entire course with the consent of their faculty advisers. Advanced standing is not applicable to the Introduction to Christian Theology (CT 32). Waiver of this rule will require satisfactory performance on a prescribed written examination. The principle of advanced standing may, on concurrence of the faculty adviser and the course instructor, be applied to distinctly introductory courses which a student elects.

Students offered advanced standing at the time of matriculation may, after consultation with their faculty advisers, decline such standing and enroll in the required course.

A summary of advanced standing options will be available at the time of registration for required courses.

Any student choosing, by virtue of eligibility for advanced standing, to substitute an elective course of three semester hours for the required course of four semester hours will have his total academic requirement (75 semester hours) reduced by one hour for each such substitution.

Language Study. A student entering the Divinity School with undergraduate preparation in Greek may elect to continue his studies in New Testament Greek at an advanced level. A junior student desiring to begin the study of New Testament Greek may elect Hellenistic Greek 103-104.

A student with advanced standing in New Testament may elect six semester hours of New Testament Greek as his advanced option in lieu of the basic required course.

A student with two years of undergraduate Greek who desires to begin Hebrew in his junior year may utilize his elective privileges of the first

year for this purpose. He must have approval of his adviser and the instructor in Hebrew.

Students are discouraged from the study of Hebrew until they have satisfactorily completed at least one year of Hellenistic Greek.

Elective Studies and Professional Aims. The curriculum intends to serve graduate-professional aims with maximum flexibility. Fifty-one (51) elective course hours are available for proper ordering and programming to serve the ends of vocational and professional incentives. This latitude manifestly lays heavy responsibility upon the student to see that he submits himself to those disciplines that most suitably prepare him for his ministerial service.

In planning his course of study, therefore, he must, in consultation with his faculty adviser, shape his course program by enlarging understanding of his eventual professional responsibilities. To this end he may need to consult several members of the faculty and staff for guidance.

Professional ministries include those of the parish, preaching, teaching, and pastoral care; ministries of education in local churches and higher education; missions; campus ministry; specialized urban and rural ministries; chaplaincies—hospital, institutional, industrial, and military; teaching; religious journalism; audiovisual communications; church agencies; and ecumenical ministries at home and abroad. For many of these the curriculum is inadequate and further specialized training will necessarily be sought elsewhere beyond the basic degree. For all of these ministries the student's program of studies can be shaped to be foundational and purposeful for the particular ministry in view.

Distribution of Elective Studies. 1. Students are encouraged to elect one course in each of the following areas or subdivisions of the curriculum beyond provisions supplied by any required courses, and to be selected with a view to the individual student's vocational and professional aims:

American Christianity
History of Religion
Christian Education
World Christianity and
Ecumenics

Biblical Exegesis
Pastoral Psychology
Christian Ethics
Worship and Preaching
Care of the Parish

(including Church and Community)

2. On the other hand, students are also encouraged to concentrate, ordinarily in not more than five advanced courses in any one subdivision of the curriculum, in an area directly supportive of and related to their vocational and professional intention.

Marked variations from these advisory guidelines will render the student's program admissible of review and revision by action of the faculty adviser, the Committee on Academic Advisers, or the Dean.

General Field Education Requirement. Each student is required to complete one *approved* assignment in field education (with or without remuneration) under supervision.

Such assignments might include an internship, a summer of full-time work, two semesters of part-time work, or involvement in church or community service. The essential criteria for graduation credit would be that the amount and quality of supervision be approved by the Field Education Office, and that the student be required to evaluate and correlate the experience directly or through his Ministering-in-Context.

Ministering-in-Context Program (Optional)

Ministering-in-Context is an interdisciplinary program with the purpose of providing a means for senior-level students to summarize and integrate their understanding of Christian ministry through reflection upon contextual experience under interdivisional faculty guidance.

The Ministering-in-Context Program is presently available as an elective option to students in the regular course of study. Students in the Honors Program are not eligible.

Purposes. The Ministering-in-Context project is initiated in the spring of the middler year and extends over both semesters of the senior year. It carries a total of six semester hours of credit. The purpose of Ministering-in-Context is to provide continuity between ministry today and the preparation for it, by assisting each student to (a) utilize interdisciplinary resources in understanding the personal and social issues of today's world; (b) identify individual forms of ministry and to match his own personal resources with the plurality of demands put upon him; (c) develop a professional role appropriate to traditional and experimental ministries; (d) test competence and readiness for ministry; and (e) develop the student's ability to provide conditions whereby a vital church and a meaningful ministry may come into being through his training, insight, and commitment.

Schedule (May Be Amended)

Middler-Spring

Students submit applications to Registrar's Office not later than February 26.

Program prospectus submitted by student to faculty guidance committee not later than April 1.

Senior-Fall

Consultations of students and faculty guidance committee for definition of project and series of progress reports.

Senior-Mid year

March and April: Students meet with their committee for evaluation of project papers.

May: Deadline of project papers, May 10.

Ordination and Disciplinary Requirements. Students preparing for ordination are strongly advised to fulfill denominational requirements for study of church polity. United Methodist students must attend to regulations of the *Discipline*, paragraph 344. Introduction to Christian Theology (C.T. 32) has been certified for the Disciplinary requirement in United Methodist doctrine.

Graduation Credits

It is the responsibility of each student to see that he meets all requirements for graduation, and to take his courses in proper sequence. He is also responsible for seeing that any special permission granted him to deviate from the normal program is properly recorded in his personal files.

Grading System

The grading system of the Divinity School employs the letters A, B, C, D, and F, which have been defined as follows: A, Excellent; B, Superior; C, Average; D, Inferior; F, Failure; WP, Withdrew Passing; WF, Withdrew Failing; WI, Withdrew Illness; W, Withdrew, discretion of the Dean; I, Incomplete; P, Passed; N.C., Non-credit; Z, Year course. (See section on Incompletes.) No percentage equivalents are stated. A student is expected to maintain an average of C.

In all courses where the instructor considers attendance a necessary part of the work of the course, a student may not receive a grade of over C if his absences total 12 percent of the regular class periods, and if the absences total 24 percent of the class periods he may not receive credit for the course.

Incompletes

A student may, with the permission of the instructor concerned, petition the Assistant Dean to receive a grade of incomplete in a course. Such permission may be granted when a student, through some circumstance beyond his control, such as illness, has been hindered from meeting the course requirements. No incomplete is recorded without permission in writing from the Assistant Dean. Ordinarily, an incomplete will not be approved in the case of students completing their academic work in the fall

semester. An incomplete automatically becomes an *F* unless it is removed through completion of assigned work by the following dates:

- for incompletes incurred in fall semester courses, March 15, following;
- for incompletes incurred in spring semester courses, October 15, following; and
- for incompletes incurred in summer courses, October 15, following.

Change of Course or Withdrawal

A student is permitted to change his registration for course work without incurring a penalty no later than completion of the second meeting of the course from which he desires to withdraw or, correspondingly, of the course to which he seeks admission.

No student shall be permitted to drop a course after the expiration of one-third of the period of instruction of the course without incurring failure, except for causes adjudged by the Assistant Dean to be beyond the student's control. Conditions of emergency and not considerations of convenience shall be regarded as determinative in considering requests.

Graduation with Distinction

Students who achieve a grade point average of 3.75 (*A*, 4; *B*, 3; *C*, 2; and *D*, 1) for overall academic record in the Divinity School are granted the degree of Master of Divinity, *summa cum laude*. Students with a grade point average of 3.5 are awarded the degree, *magna cum laude*. Such distinction is specified on their diplomas.

The Master of Religious Education Degree

The course of study leading to this degree is designed for persons desiring to prepare for leadership and service in the educational ministry of the church.

Admission

Applications for admission to the Master of Religious Education program are evaluated by the same standards as those applicable to the Master of Divinity degree and admission requirements and procedures are also the same. Students planning to specialize in Christian Education should study carefully those sections of this *Bulletin* which contain statements of policy regarding the most appropriate prerequisite studies for

theological education and the procedures to be followed in applying for admission.

Requirements

The Master of Religious Education degree normally requires two years, or four semesters, of residence and study and the fulfillment of the following requirements:

- 1. Eighteen courses selected by the candidate in consultation with the director of the program or his representative. (See paradigm of program below.)
- 2. Field project, supervised by the director of the program, with final oral examination by committee.

A candidate having an academic average of *B* or better in undergraduate studies may be permitted to “read out” in a maximum of two courses, usually scheduled one in each year, provided application for this privilege is approved by the director of the program and the instructor(s) involved. A student not approved for “reading out” in the first year may qualify for this privilege in one course in the second year on the basis of a *B* or better average in the first year.

Program of Study for M.R.E. Degree

<i>Required units</i>	<i>Courses</i>
Colloquium (fall semester, first year)	1
Field Project (usually fall semester, second year)	1
<i>Limited electives*</i>	
Two courses in the Biblical Division	2
Two courses in the Historical Division	2
Two courses in the Theological Division	2
Two courses in the Ministerial Division (Other than Christian Education)	2
Four courses in Christian Education	4
<i>Free electives†</i>	3
<i>Cognate course in another department†</i>	1
Total	18

*Limited electives may be completed through tutorials, if approved by the director of the program and the instructor(s) involved, provided the total number of tutorials is no more than 4.

†All electives and cognate courses must be chosen by the student in consultation with the director of the program and subject to the approval of the Educational Affairs Council.

The Master of Theology Degree

The course of study leading to the degree of Master of Theology is designed for graduates of accredited theological schools who desire to continue or resume their theological education for enhancement of professional competence in selected areas of study. Enrollment in the Th.M. degree program is open to a limited number of students who have received the M.Div. (or the equivalent) with superior academic records.

Admission inquiries may be addressed to the Assistant Dean for referral to the Director of the Th.M. program.

General Requirements

The general requirements for the degree of Master of Theology are:

1. Twenty-four semester hours of advanced studies, with an average grade of *B* (3.00 average on a 4.00 scale).
2. Superior performance in a comprehensive examination covering the major area of study. As an alternative to the comprehensive examination the student may elect to do a research project in his major area if approved by supervising professor. This project shall carry 3 s.h. credit, to be counted within the twenty-four hours required.
3. Residence for one academic year.

There are no general language requirements, but classical or modern languages may be required for certain programs (for example, in Biblical studies, Hebrew or Greek).

The Program of Study

At least twelve of the required twenty-four hours must be taken in one of the basic divisions of study (Biblical, historical, theological, or ministerial) which shall be designated as the candidate's major, and at least six hours in another of the divisions which shall be designated as the candidate's minor. No more than six semester hours of work completed in another accredited institution may be transferred and credited toward the degree. Ordinarily, no more than six hours may be taken through directed reading, and no more than three in any one semester. In the area of pastoral psychology, up to twelve hours may be taken through clinical training.

The comprehensive examination will be given at the close of the course of study for the degree, ordinarily in May or September.

The entire program of studies and comprehensive examination should be completed within twelve months. In some cases, the time limit may be extended, but in no case beyond three years.

The candidate majoring in pastoral psychology chooses between a program which emphasizes clinical pastoral education in the institutional setting and one which emphasizes pastoral care and counseling under supervision in the parish setting. The CPE program provides certified training through the Association for Clinical Pastoral Education; the Pastoral Care and Counseling program provides supervised training toward certification by the American Association of Pastoral Counselors. In either case, course PP277A (or its equivalent) is considered a prerequisite for a major in pastoral psychology. (The four semester hours of credit are not applicable toward the twenty-four hours required for the degree, although the course will be indicated on the student's transcript). Accordingly, the student majoring in this area should ordinarily make provision for a program extending for a full calendar year, beginning the first full week in June.

Financial Aid

Candidates for the Th.M. degree are eligible for financial aid on the same basis as all regularly enrolled Divinity School students.

Please note in the pertinent sections of the chapter on Financial Information that the charges for tuition and general fee for the Th.M. degree are combined and are made on the basis of the number of semester hours taken, and that in order to be eligible for medical and surgical care a student must be taking at least seven hours.

Conduct of Students

Duke University expects and will require of all its students continuing loyal cooperation in developing and maintaining high standards of scholarship and conduct.

The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University as currently in effect or, from time to time, are put into effect by the appropriate authorities of the University.

Any student, in accepting admission, indicates his willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate, for failure to abide by such rules and regulations or for conduct adjudged unsatisfactory or detrimental to the University.

Community Life

Living Accommodations

Duke University strives to provide comfortable, attractive living accommodations for graduate-level resident students, both married and unmarried.

The Graduate Center houses men and women enrolled on a full-time basis in the Graduate School and the professional schools. Graduate women are also assigned to Hanes Annex, a residence hall, and to Town House Apartments located between the West and Woman's College campuses.

The Graduate Center houses 197 male graduate students, 56 women graduate students, and 117 women undergraduates. Commons facilities on the main floor are shared by men and women.

Hanes Annex has 39 beds for graduate and allied health students. The second floor of this building is used by seniors in the School of Nursing. Commons areas are jointly used by the two groups.

Rooms in residence halls are normally rented for the academic year, but for no period less than one semester or specified term.

Town House Apartments include 30 two-bedroom units, each furnished for three graduate women students. Two students occupy the master bedroom and the third occupies a smaller bedroom. A living room, kitchen, and one and a half baths complete these attractive living units.

The University now leases 104 two- and three-bedroom apartment

units for use by married graduate students. As compared with similar apartment properties in the Durham area, rental of the Duke-leased units provides financial advantage to most students accepting leases through the University Department of Housing.

Detailed information about University housing facilities for single and married students, including rental rates, will be provided upon request by the Department of Housing Management, Duke University, Duke Station, Durham, N.C. 27706.

Rooms in residence halls and spaces in Town House Apartments or other rental units may be reserved by applicants only if they have been accepted by the Divinity School, and after the required \$25 room or security deposit has been paid to the University. The initial room or security deposit is required with the application and is held until the room or apartment is vacated. Application forms and detailed information on graduate housing will be mailed when the Divinity School has notified the Department of Housing Management of official acceptance of the student. Single women may express a choice for the type of housing desired. Completed applications for rooms and apartments are to be returned, with required deposits, to the Department of Housing Management, Duke Station, Duke University, Durham, N.C. Assignment priority is established by the date of receipt of completed applications with deposits in this office.

Regulations governing occupancy of rooms and apartments will be provided by the Department of Housing Management at the time application forms are forwarded to accepted students. Occupants within each type of housing are expected to comply with the appropriate regulations.

For the cost of housing and for details on rental refund policy, see the section on Housing in the Financial Information chapter.

Food Services

Food service on both the Woman's College Campus and the West Campus is cafeteria style. The dining facilities on the West Campus include one straight-line cafeteria with multiple-choice menus, a free-flow service area which includes cafeteria counters as well as a grill, and a table service dining room called The Oak Room where full meals and *a la carte* items are served. The Cambridge Inn, which is a self-service snack bar also located in the West Campus Union, is open from 9:00 a.m. until 12:30 a.m. each day except Saturday. All types of snack and sandwich items are available here. The Graduate Center has a cafeteria open at meal hours, and a coffee lounge which is open until 11:00 p.m. Because of the large number of those served in the dining halls, it is not possible to arrange special diets for individual students.

For cost of food services, see the chapter on Financial Information.

Divinity School Choir

A student organization of long standing is the Divinity School Choir. Membership in the Choir is open to all qualified students. The Choir sings regularly for the daily corporate worship and at special seasonal programs and services. New members are chosen by informal auditions held during the first week of fall classes. Auditions are arranged for all who are interested.

The Student Association

The officers of the Student Association are elected and serve as an executive committee for conduct of the business of the Representative Assembly. The Directory of the Divinity School annually carries information relating to the structure and function and the roster of student representatives, elected or *ex officio*.

The purpose of the Association is to channel the interests and concerns of Divinity School students to the following ends:

1. To provide student programs and activities;
2. To represent students to the faculty and administration;
3. To represent students with other university organizations; and
4. To represent students in extra-University affairs.

Other Organizations

Divinity Dames

The wives of Divinity School students have an organization through which there is opportunity for informal fellowship during the period of the students' residency. For the past several years lecture courses, running for two-week periods in the fall and spring semesters, have provided instruction in various aspects of parish life and in theological and Biblical subjects and issues. The Dean and faculty are concerned to assist the wife to understand her husband's vocation and to participate appropriately.

The Duke Endowment Student Association

The Duke Endowment Student Association is the organization of students who participate in the Field Education Program.

At least six meetings per year are held for the purpose of fellowship and preparation for the field education responsibilities.

The Duke Divinity School Review

Three times each year (autumn, winter, and spring) the Divinity School publishes a magazine designed to acquaint its readers with current theological thinking through the inclusion of public addresses given at the school, articles by faculty members and others, and book reviews. The *Review* is circulated free of charge to a mailing list of some 2,600, including alumni of the School, interested friends, campus ministers, teachers, administrators, and librarians. It is also available to students upon request.



Financial Information

Fees and Expenses

Estimated Living Expenses

The total cost for a student to attend the Duke Divinity School varies according to individual tastes and requirements; however, experience indicates that a single student may expect to spend from \$2,400 up, with the average approximately \$2,600, and a married couple may expect to spend from \$4,500 up.

Master of Divinity and Master of Religious Education Candidates

The table below lists only basic minimum expenditures. In addition to the fees cited here, there is an admission fee of \$30.00 which is applied to the first term bill, and a room deposit of \$25.00. (See the relevant sections in Admissions and Housing for full details.)

	<i>Per Semester</i>	<i>Per Year</i>
Tuition—M.Div. and M.R.E.	\$525.00	\$1,050.00
Approximate cost of meals	300.00	600.00
Room (double) Graduate Center	162.50	325.00

Tuition will be charged at the rate of \$42 per semester hour. The figures shown are for a program carrying 25 semester hours per annum. A

student who is a candidate for either the M.Div. or M.R.E. degree shall be liable for tuition at the hourly rate until completion of all requirements for the degree.

Master of Theology Candidates

A student who is a candidate for the Th.M. degree will be liable for tuition on the basis of 24 semester hours at the rate of \$42.00 per semester hour. All other costs and regulations for the Th.M. degree are the same as those for the M.Div. and M.R.E. degrees.

Special Student

A special student is one who is enrolled for academic credit, but who is not a candidate for a degree at that time. The tuition will be charged on an hourly basis. Other costs and regulations are the same as those for the M.Div. and M.R.E. candidates. No financial aid is available.

Audit Fee

Anyone seeking to audit a course in the Divinity School must, with the consent of the instructor concerned, secure permission from the Dean's office. In accordance with the general University practice, a fee of \$31.50 per course will be required of all auditors who are not enrolled students.

Athletic Fee

Divinity School students may secure admission to all regularly scheduled University athletic contests held on the University grounds during the entire academic year by payment of the athletic fee of \$25.00 per year, plus any federal tax that may be imposed. This fee is payable in the fall semester.

Payment and Penalty

The tuition is due and payable not later than the day of registration for that semester. In unusual circumstances, a student may secure permission of the Dean to delay registration, provided it is not beyond the first week of classes and the student pays the \$10.00 late registration fee. No student is admitted to classes until arrangements are made with the Bursar of the University for the settlement of fees. After the day of registration no refund of tuition will be made except if the student involuntarily withdraws to enter the armed services or dies during the course of the semester.

A student who is reported by the Bursar's Office as delinquent in

his account will be debarred from credit in courses, nor will he be approved for graduation until all indebtedness has been settled.

Student Health

The payment of tuition entitles the student who is taking a minimum of seven hours to full medical and surgical care, with the exceptions noted below. This service is under the direction of the University physician with the cooperation of the staff of Duke Hospital. It includes hospitalization, medical and surgical care, drugs, dressings, X-ray studies, and ward nursing. A charge for board is made at the same rate as in the University dining halls. Refraction of eyes, treatment of teeth, and of all chronic conditions, such as the removal of diseased tonsils, are not included in this service. The cost of any necessary braces and orthopaedic appliances, as well as of special nursing, must be borne by the student.

Since the Student Health Program *does not cover students while away from the Duke Campus*, it is imperative that student pastors and assistant pastors (winter and/or summer) who are subjected to the hazards of highway travel with great frequency, secure complementary health and accident insurance for the full twelve month period. Students whose course load entitles them to full coverage under the Student Health Program are eligible to secure a complementary insurance policy, providing protection for the entire calendar year, through the University. Costs and details of the complementary policy are available from the Assistant Dean. Students in internship programs carrying less than seven semester hours in any given semester are strongly encouraged to apply for this insurance. *Foreign students are required to hold this or another acceptable policy.*

Married students are required to carry insurance coverage for their dependents, providing for hospital, medical, and surgical care.

Living Accommodations

Housing

Rooms in residence halls are normally rented for the academic year, but for no period less than one semester or specified term.

The rental charge for each person assigned to a double room in the Graduate Center is \$325.00 for the academic year, and in Hanes Annex, \$355.00 for the same period. A limited number of single rooms are usually reserved for returning students.

Each student assigned to the Town House Apartments is currently charged \$495.00 for the academic year on the basis of three individuals to an apartment. Utility charges are included in these rates.

Rates for apartments will be provided upon request by the Director of Housing Management.

Rooms in residence halls, Town House Apartments, and apartment complexes may be reserved by applicants only if they have been accepted by the Divinity School and only after the required \$25.00 room or security deposit has been made with the Duke University Bursar. This initial deposit is held until the room or apartment is vacated.

No refund on residence hall room rent or the rent for spaces in Town House Apartments is made to students who withdraw after the date of registration, except for those who involuntarily withdraw to enter the armed services. Such refunds will be made in accordance with the University's established schedules. Rental rates are subject to change prior to the beginning of the 1970-71 academic year.

For further information on housing facilities, see Living Accommodations in the chapter on Community Life.

Food Services

Food service, on both the Woman's College Campus and the West Campus, is described under Living Accommodations. The cost of meals approximates \$2.50 to \$3.00 per day, depending upon the needs and tastes of the individual.

Motor Vehicles

Each student possessing or maintainng a motor vehicle at Duke University shall register it annually at the beginning of the fall semester. If a student acquires a motor vehicle and maintains it at Duke University after academic registration, he must register it within five (5) calendar days after operation of the vehicle on campus begins. Resident students are required to pay an annual parking fee of \$30.00 for each automobile and \$10.00 for each two-wheeled motor vehicle. The proper registration emblem must be displayed at all times.

At the time of registration of a motor vehicle, the following documents must be presented: (a) state vehicle registration certificate; (b) valid driver's license; (c) satisfactory evidence of automobile liability insurance coverage within limits of at least \$10,000.00 per person and \$20,000.00 per accident for personal injuries, and \$5,000.00 for property damage, as required by North Carolina Motor Vehicle Law.

Students will receive a copy of the Parking, Traffic, and Safety Regulations when they register.

Student Aid

A student should select his school on the basis of educational opportunity. At the same time financial consideration will be a legitimate and often pressing concern. Each student should formulate at least a tentative plan for financing his seminary education. While the exact method of financing the full theological degree cannot be assured at the beginning, he should have a clear understanding of his expenses and the sources of income for his first year and the assurance that there exist ways of financing the subsequent years.

The Committee on Scholarship and Financial Aid will counsel the student concerning financial needs and possible resources. A first principle of our financial aid program is that basic financial responsibility belongs to the student who is expected to rely upon his personal and family resources and his earning and borrowing power. Financial aid is provided to supplement student resources to the extent of demonstrated need.

In estimating student budgets, the Financial Aid Office adds to the fixed cost of educational expenses (tuition, fees, etc.) the average cost per student, providing for variations occasioned by the student's status (single, married, dependents, student pastor, indebtedness, etc.) at the time of admission. Students are allowed to exercise freedom and express their legitimate individuality in the use of their funds, but financial aid support is necessarily determined by what is considered average for students within the same category. To maintain a creative and at the same time a realistic program of financial aid, it is essential both to understand and to follow basic principles undergirding the program.

Resources are not sufficient to guarantee the complete underwriting of every student's seminary education. However, it is the goal of the Financial Aid Office to assist each student in planning his financial program so that he will incur as little indebtedness as possible.

The Financial Aid Office constantly reviews available resources in order to assist the greatest number of students. It recommends assistance on the basis of demonstrated need and then within the limits of the conditions set forth governing each resource.

Financial assistance may consist of scholarships, loans, tuition grants, grants-in-aid, field education grants, and employment which may be worked out in various combinations on a year-to-year basis with reapplication and review each year.

Financial Resources

Personal

These may be savings and earnings, gifts from family and friends, and, if married, earnings of spouse and gifts from parents of spouse. In calculating anticipated income, the student first considers his own resources.

Church

Many local churches and conferences or other governing bodies provide gifts and grants for theological education, such as Ministerial Education Funds which provide grants and/or service loans to theological students. The student makes application to his own church, Annual Conference, Presbytery, or other governing body. The Financial Aid Office co-operates with these church agencies in making recommendations and in handling the funds. Both United Methodist students and others must be under the care of the appropriate church body to be eligible for church support. The School cannot compensate for a student's indisposition to receive church funds when such are available on application through the Annual Conference Ministerial Education Fund.

The Divinity School

Scholarships

A limited number of scholarships are available to encourage qualified students to pursue their preparation for the Christian ministry. Such students ordinarily will not be eligible for remunerative employment during the academic year. When a student holding a scholarship is permitted to engage in remunerative employment, it is understood that adjustments may be made in the total Scholarship and Financial Aid Program for that student:

Junior Scholarships. Junior Scholarships are available to a limited number of students who have maintained an outstanding undergraduate record in scholarship and community life. Junior Scholarships consist of grants of \$775; tuition grants in varying amounts up to full tuition if demonstrated need warrants; and, if the student applies, preference in the selection of students for the Summer Endowment and Field Education Program. Junior Scholarships are offered for the junior year only.

National United Methodist Scholarships. The General Board of Education of the United Methodist Church makes available two \$500 scholarships to rising middlers who have made outstanding records in the first-

year class. The Department of the Ministry offers these scholarships to students preparing for the parish ministry.

Middler Scholarships. A limited number of scholarships up to \$700 each are made available on application to rising middletons on the basis of academic attainment, character, and promise in the Christian ministry.

Rowe Scholarships for Seniors. Each year a limited number of scholarships in varying amounts are awarded to rising seniors who have achieved academic excellence and who give unusual promise of service in the ministry.

Foreign Student Scholarships. In cooperation with the Crusade Scholarship Committee of The United Methodist Church and other authorized church agencies students are selected and are admitted to courses of study. Scholarships for such students are provided from the Lewis Clarence Kerner Scholarship Fund and from individual churches and private philanthropy.

Th.M. Scholarships. A limited number of scholarships, based on academic achievement and financial need, are awarded each year.

M.R.E. Scholarships. A limited number of scholarships, based on need and academic achievement in undergraduate school, are available.

Tuition Grants

These are available in amounts commensurate with demonstrated need as adjudged by the Committee on Scholarships and Financial Aid. Entering students may apply, on notice of admission, by submitting the Financial Aid Inventory to the Office of Financial Aid. Enrolled students may apply by annual renewal of their Financial Aid Inventory, subject to review with each semester registration. Because of the purpose and attendant educational objectives of the school, resources for tuition grants are primarily available to students with declared ministerial aims or those concerned to explore a ministerial vocation leading to ordination or recognized lay ministries.

Field Work Grants

Varying amounts are made available through the Divinity School to students who choose to participate in the Endowment and Field Work Program. This program includes the following: (1) summer assistants, (2) winter assistants, and (3) student pastors. See full description under section on Field Work.

Field Education Grants

A student may elect to use his field work for educational purposes. (See section 2 under Types of Field Education.) In this case, his Field Work Grant becomes a Field Education Grant.

Loans

Loan funds held in trust by the University, as well as United Methodist Student Loans and funds supplied by the federal government, through the National Defense Education Act of 1958, are available to qualified students. Submit application by July 1.

Note: Unless otherwise indicated, all correspondence concerning financial aid should be directed to: Financial Aid Office, The Divinity School, Duke University, Durham, N.C. 27706.

Employment

Students or wives desiring employment with the University should apply to the Director of Personnel, Duke University, Durham, North Carolina. Students or wives make their own arrangements for employment either in the City of Durham or on campus.

Financial Aid Resources

Certain special funds have been established, the income from which is used to provide financial aid through scholarships and Field Education Grants for students wishing to secure training in preparation for Christian ministry. The resources listed below include endowed funds and sources of annual contributions.

R. Ernest Atkinson Legacy. This legacy was established in 1952 under the will of the Reverend R. Ernest Atkinson of Richmond, Virginia, who was a member of the Trinity College Class of 1917.

E. M. Cole Fund. This fund was established in 1920 by Mr. Eugene M. Cole, a United Methodist layman of Charlotte, North Carolina.

Dickson Foundation Awards. The Dickson Foundation, Incorporated, of Mount Holly, North Carolina, has created a scholarship program for the purpose of providing assistance to Divinity students who demonstrate financial need and superior ability.

Preference is given to children of employees of American and Efird Mills, Incorporated, and its subsidiaries, to residents of Gaston, Caldwell, and Catawba Counties, and to North Carolinians.

The Duke Endowment. Among the beneficiaries of The Duke Endowment, established in 1924, are the rural United Methodist churches of the two North Carolina Conferences. Under the Maintenance and Operation Program, Field Education Grants are available for Duke Divinity School students to participate as assistant pastors in rural United Methodist churches under the Endowment and Field Education Program.

N. Edward Edgerton Fund. This fund was established in 1939 by Mr. N. Edward Edgerton of Raleigh, North Carolina, an alumnus of Duke University of the Class of 1921.

Thomas Jefferson Finch Scholarship. In 1955 Mr. George David Finch, '24, and Mr. Brown Faucette Finch, '54, established an annual scholarship in the amount of \$750 a year in memory of Mr. Thomas Jefferson Finch, Trinity College Class of 1884, who was the father and grandfather of the donors.

The James A. Gray Fund. In 1947 Mr. James A. Gray of Winston-Salem, North Carolina, presented the fund, which bears his name, to the Divinity School for use in expanding and maintaining its educational services in behalf of North Carolina churches and pastors.

P. Huber Hanes Scholarship. The late Mr. P. Huber Hanes, Sr. of Winston-Salem, North Carolina, an alumnus of Duke University of the Class of 1900, established for Duke University an annual scholarship fund, a portion of which is used to provide financial assistance for Divinity School students.

The Franklin Simpson Hickman Memorial Fund. In the summer of 1966 Mrs. Veva Castell Hickman established a memorial fund in memory of her husband, The Reverend Professor Franklin Simpson Hickman, who served as Professor of the Psychology of Religion, 1927-1953; was Dean of the Chapel of Duke University, 1932-48; and the first Preacher to the University, 1938-53. The income of the Fund will give support to two enterprises: (1) a regular visiting lecturer in preaching, and (2) financial aid to students in the Master of Theology program who wish to specialize in the psychology of religion, or the psychological study of religious experience.

George M. Ivey Scholarship Fund. This fund was established in 1948 by gift of George M. Ivey, of Charlotte, North Carolina, an alumnus of Duke University of the Class of 1920.

Lewis Clarence Kerner Scholarship. This scholarship was established in 1959 by Beatrice Kerner Reavis, of Henderson, North Carolina, in memory of her brother, Lewis Clarence Kerner, and designated for the assistance of native or foreign-born students preparing for service in world Christian missions.

The John Haden Lane Memorial Scholarship Fund. This fund was established in 1968 by Mr. Edward H. Lane, Jr. in memory of his brother, Dr. John Haden Lane, and is designated for the benefit of meritorious students pursuing an advanced degree such as the Master of Theology in the field of pastoral psychology whose academic training entailed clinical pastoral education.

Laurinburg Christian Education Fund. This fund was established December 11, 1948, by gift through the Methodist College Advance Fund.

Myers Park Scholarship Fund. This fund was established in 1948 by members of the Myers Park United Methodist Church, Charlotte, North Carolina.

W. R. Odell Scholarship. This fund was established in 1946 by the Forest Hills United Methodist Church, Concord, North Carolina.

Jesse M. Ormond Scholarship Fund. In 1948 the North Carolina Conference established a fund in honor of Professor Jesse M. Ormond, who for many years was Director of Field Work and Professor of Practical Theology.

Gilbert T. Rowe Memorial Scholarship Fund. This scholarship fund was established in 1960 through the generosity of Divinity School alumni and friends of the late Gilbert T. Rowe, Professor of Systematic Theology.

Elbert Russell Scholarship. This scholarship was established in 1942 by the Alumni Association of the Divinity School in honor of Elbert Russell, who served as Dean of the Divinity School and Professor of Biblical Theology.

Hersey E. Spence Scholarship. This scholarship was established in 1947 by the Steele Street Methodist Church of Sanford, North Carolina, in honor of Professor Hersey E. Spence, a former pastor of the congregation.

The United Methodist Church. The United Methodist Church makes a substantial contribution to the Divinity School by designating a certain percentage of its World Service offerings to the Divinity School.

The North Carolina and the Western North Carolina Conferences direct a certain percentage of their College Sustaining Funds to the Divinity School. The South Carolina Conference is a contributor to the Divinity School operational income.

The General Board of Education makes available annually two National United Methodist Scholarships having a cash value of \$500 each.

Local United Methodist churches and individuals make contributions to the financial aid program of the Divinity School, thus making it possible to assign students under the Endowment and Field Education Program to urban and out of state churches.

Dempster Graduate Fellowships. The United Methodist Board of Education offers each year the Dempster Graduate Fellowships for graduates of United Methodist Theological Schools, who are engaged in programs of study leading to the degree of Doctor of Philosophy in religion with a view to teaching in United Methodist colleges and seminaries. Several Divinity School graduates have held these fellowships.

Admission

Requirements and Procedures for Admission

The Divinity School is a fully accredited member of the American Association of Theological Schools, and is one of fourteen accredited seminaries of The United Methodist Church. Candidates for admission must hold the degree of A.B., or its equivalent, based upon four years of work beyond secondary education in a college which is approved by one of the regional accrediting bodies, and their college records must be such as to indicate their ability to carry on graduate professional studies. They will be admitted without examination on presentation of an official, satisfactory transcript of college and all other academic credits which they may have secured. Recommendations are required. Applicants will be considered without regard to race, religion, sex, or national origin.

Applications are evaluated with a view both to the academic achievement of the candidate and with reference to his personal and professional qualifications for the Christian ministry. While an academic average of less than *B—* is ordinarily regarded as a disqualification for admission, nevertheless, the Committee on Admissions is impressed with a rising curve of achievement in the undergraduate program and makes its decision on the basis of the whole body of credentials of an applicant, including supporting letters of reference.

The applications of students from foreign countries will be considered, each on its own merits, the general principle being that training equivalent

to that of a baccalaureate degree from an accredited American college must have been secured.

In addition to an adequate academic preparation, applicants must satisfy the faculty as to their Christian character and purpose. An application blank may be secured from the Admissions Office of the Divinity School. Applications received after May 1 cannot be assured of dormitory rooms for the ensuing academic year. *A minimum of thirty days is required to process any application, in many cases longer.*

No admission is final until approved by the Student Health Service, which requires a certificate of immunization and general health to be submitted not earlier than July 1 and not later than September 1.

Entering students are also required to take tests administered by the University Counseling Center and the Divinity School.

Persons who do not matriculate at the time for which they were originally admitted forfeit admission unless postponement has been made for later entrance. A student who withdraws and desires to return at a later date must file with the Dean a written request for a leave of absence.

Applicants are expected on notification of admission to signify their acceptance within three weeks, and to pay an admission fee of \$30.00. (Make check payable to Duke University and send to the Admissions Office of the Divinity School.) This fee is applied to the regular first-term bill if the student matriculates.

Under the terms of the Selective Service Act, pre-enrollment for later admission may be granted to persons who meet the Divinity School standards for admission. Applications for pre-enrollment may be addressed to the Admissions Office. Pre-enrolled students send transcripts of each year's college work by June 15 of each year in which they are pre-enrolled. Pre-enrollment does not guarantee final admission.

Students should consult this *Bulletin* on Financial Aid and Resources (pages 31 and 33).

Pre-Seminary Curriculum

The Divinity School of Duke University publishes as its own the policy statement of the American Association of Theological Schools respecting undergraduate preparation for graduate-professional theological studies.

The student contemplating theological study should correspond at the very earliest opportunity with the school or schools to which he intends to apply and with the authorities of his church in order to learn what will best prepare him for the specific program he expects to enter. He will be likely to find under the guidance of the seminary that he should consider the following subjects:

English language and literature; history, including non-Western

cultures as well as European and American; philosophy, particularly its history and its methods; natural sciences, both the physical and the life sciences; social sciences, where psychology, sociology, and anthropology are particularly appropriate; the fine arts and music, especially for their creative and symbolic values; Biblical and modern languages; religion, both in the Judeo-Christian and in the Near and Far Eastern traditions.

Some seminaries require Greek or Hebrew for admission, and many advanced biblical courses are offered in the original tongues; modern languages have a less direct but immensely educative role and are required at the graduate studies level.

It is the understanding gained in these fields rather than the total of credits or semester-hours which is significant.

In many seminaries students who have been well prepared in religion and equipped with the tools of theological study will be set free, not to complete their theological course more quickly, but rather to pursue more advanced studies. The principle constantly to be kept in mind is not that of satisfying paper regulations and minimum requirements, but of making the most of opportunities for education.

Transfer of Credit

Under certain conditions transfer of credit from theological schools accredited by the American Association of Theological Schools is provided for by the Divinity School. Applications for transfer of credit will be ruled upon by the Committee on Admissions, and will be subject to evaluation in terms of the prevailing requirements of the Divinity School for graduation. Ordinarily, credit from another institution will not be granted in amount exceeding one-half of the total credits required by the Divinity School for graduation. A student applying for transfer of credit in excess of this amount may be required to pass such examinations as the Committee on Admissions may prescribe. In each case a letter of honorable dismissal from the school from which transfer is made is required along with transcript of academic credits.

Advanced Standing

Advanced standing allows entering students to begin work in any given field at a level higher than that of the required curriculum, or to substitute a specialized or cognate course for a required one.

Entering students with substantial undergraduate preparation in areas closely related to required courses of the Divinity School may be eligible for advanced standing. While a student may be eligible for advanced standing in any subject, it is especially pertinent where students offer undergraduate majors of superior quality in Bible, religion, or philosophy. Students entering with six or more semester hours in the Greek language

should consult the *Bulletin* under Language Study for a description of special privileges pertaining to their case. The fields in which entering students, by virtue of previous undergraduate study, are most likely to qualify for advanced standing are: Old Testament, New Testament, and Church History.

An entering student who offers not less than six semester hours of college credit, with a grade of *B* or better in one or more of these areas, may ordinarily anticipate advanced standing in correspondingly required courses. All final transcripts will be studied, and advanced standing will be accorded to those who qualify under this provision.

A student who offers not less than three semester hours of college credit with a grade of *B* or better in one or more of these areas may, for satisfactory performance in a qualifying examination in the discipline, be granted advanced standing. Entering students who qualify under this provision must, on notice of admission, make request for the privilege of sitting for such an examination.

Admission on Probation

Applicants for admission who are graduates of non-accredited colleges will be considered on their merits. Ordinarily, such applicants must show that they have attained a superior average for a four-year college course. Admission of such persons will, in every case, be on probation.

Applicants for admission who are graduates of accredited colleges but whose college transcripts do not fully meet Divinity School standards may be admitted on probation if their recommendations otherwise justify admission.

Probation means:

1. Students who during the first year of Divinity School work maintain less than a *C* average, including one or more failures, ordinarily will be required to withdraw from the School.
2. Students admitted on probation may carry only limited schedules of work, the amount to be determined by the Assistant Dean.
3. A student admitted on probation ordinarily shall not be admitted for advanced standing.

Students whose work after admission is not satisfactory may be placed on probation.

Ministerial and Professional Qualifications

All students who are admitted to academic study in the Divinity School are subject to the established order of administrative regulations of the University and the accepted standards of personal conduct it enjoins; continuance in the School is conditioned upon acknowledgment of and compliance with such regulations and standards.

In particular, the University and the Divinity School expect and require

students in candidacy for degrees, leading to a ministerial vocation, not only to exemplify the dignity of their calling, but to exhibit attitude and conduct conformable with the recognized standards of their Christian profession. While no honor system relating to academic integrity is formalized within the Divinity School, application for and admission to the courses of study assume the student's assent to full compliance with recognized standards of integrity in the fulfillment of academic tasks.

On this prior understanding, therefore, the University reserves the right, and matriculation by the student is a concession to this right, to compel the withdrawal of any student whose conduct at any time is not satisfactory to the University, even though no specific charge is made against the student.

As a graduate-professional school of theology, the Divinity School expects, on the part of the student, an increasing manifestation of maturity and professional purposiveness in discharge of personal and academic responsibilities appropriate to the level of advanced academic work leading to the high and exacting demands of the Christian ministry. Since personal and professional qualifications for the ministry will be considered in evaluating the candidacy of all students for degrees, students whose progress or development indicate that they are not suited to the work of the ministry will not be allowed to continue in the School.

English Deficiency

Students whose English testing scores show marked deficiency or who are reported by their instructors as deficient in English usage will be required to take Remedial English in addition to meeting other requirements for the Master of Divinity degree.

Faculty Advisers

Each entering student is assigned to a faculty adviser with whom he will consult concerning his course of study. The student will continue to consult with his adviser throughout the period of his academic work.

Field Education

Its Nature and Purpose. Field Education has a two-fold nature: (1) As a clinical dimension of theological education, it provides a context for growth in professional competence and self-understanding, testing of theory in observation and practice, and application of theological, psychological, and sociological insights to experiences in the field; and (2) It is, moreover, a symbol of the relationship between the critical, intellectual life of the church that occurs in the seminary and the ministry and mission of the church that is practiced in the world.

The Field Education Program conceives of ministry as a function of the church. It embraces manifold expressions within singleness of motivation by the Holy Spirit and its relationship to the church. We recognize both the validity of specializations and the need to introduce students to a broad spectrum of parish-related and non-parish ministries. Field education experience in the student's intended ministerial function will be arranged when possible, usually in the senior year.

Types of Field Education

1. *Approved Assignments.* The Master of Divinity curriculum requires that each student "... complete one approved assignment in field education (with or without remuneration) under supervision. . . . Such assignments might include an internship, a summer of full-time work, or two semesters of part-time work, or involvement in church or community service. The essential criteria for purposes of meeting the requirement would be that the amount and quality of supervision be approved by the Field

Education Office and that the student be required to evaluate and correlate the experience directly or through his Ministry-in-Context."

With the exception of internships which are subject to special educational criteria, the approved assignments are characterized by the quality of supervision employed in placement and in the meeting of students in concomitant peer groups under the leadership of trained supervisors. One such approved assignment will be arranged for each student during his Master of Divinity course of study.

A student may satisfy the requirement of an approved assignment in field education by (1) successful completion of an internship, (2) a summer of full-time work under the conditions listed above, (3) two semesters of part-time work under the conditions listed above, (4) involvement in other approved service under supervision as defined, (5) credit for a quarter of Clinical Pastoral Education, (6) a Ministering-in-Context project that presupposes field experience, when supervision of the field work is judged by the Director of Field Education to have been satisfactory, (7) field work under the direct supervision of a qualified professional, e.g., Edgemont, and (8) a student pastorate under supervision as defined above.

2. *Field Work for Educational Purposes.* Under the provisions listed below, students may employ their field work (See the section on Types of Field Work in this *Bulletin*, p. 43.) for educational purposes. Most assignments currently made by the Office of Field Work Placement will not be made for explicitly educational purposes. Churches generally seek the services of students to do particular jobs, and students are assigned to these positions with their consent and at their request. The Field Education Office is not necessarily involved with such field work.

Some students may nevertheless discover educational potential in these positions and apply therefor to the Field Education Office for recognition of their work as field education. A one-page prospectus indicating the way in which one expects to use field experiences as learning opportunities should then be submitted to the Field Education Office for approval. Upon approval of a prospectus, an adviser will be assigned to oversee the students' field-learning experience. Instead of receiving *Field Work Grants*, such students will then receive *Field Education Grants* to enable them to pursue their education in the field. When a field work assignment is modified in this way, the student is expected to take initiative in making his work educational, and the responsibility is his to demonstrate to the satisfaction of the Field Education Office and his supervisor that his work is educational.

The Divinity School does not assume responsibility for making all field work educational; it does, however, recognize that a job which is taken initially for remuneration or service may be found by the student to be educationally significant or promising.

3. *Internships*. An expanding program of nine to twelve months internships is currently available. Periodic reports to the assigned faculty adviser are required and academic credit is given upon the satisfactory completion of a relevant academic study program. Students who have completed at least two full years of their seminary curriculum are eligible to apply. See section on Internships in the chapter entitled Courses of Instruction, p. 69.

Field Work Placement

The purpose of the Office of Field Work Placement is (1) to provide opportunities for students to serve in churches and other contexts for ministry, (2) to assist students financially, and (3) to help churches and other agencies to find the workers they need.

Work assignments may be used for educational purposes subject to provisions outlined under the section Types of Field Education in this *Bulletin*, p. 41.

Types of Field Work

1. *Summer Assistant Pastors*. Upon request of a church, a student is assigned by the Committee on Field Work Placement to serve ten weeks as an assistant. The student is provided board, room, laundry, necessary travel, and a Field Work Grant of \$1,200.00. (The grant may become a Field Education Grant subject to the provisions listed in paragraph 2 of the section on Field Education above). To participate, the student must complete the preparatory training. A majority of the students are assigned to United Methodist rural charges in the State of North Carolina. Although prior consideration is given to rising middler and senior students, a limited number of entering students can be assigned. Students transferring to another seminary are not eligible for assignment the summer prior to transfer.

2. *Winter Assistant Pastor*. Students are assigned in consultation with pastors, church leaders, district superintendents, and/or other responsible leaders, and serve as assistants to ministers during the academic year. Work time will vary from six to sixteen hours per week, and the Field Work Grants will vary accordingly, up to a maximum of \$1,200.00. (The grant may become a Field Education Grant subject to conditions listed in paragraph 2 of the section on Field Education above.)

3. *Student Pastors*. A student may be appointed by an annual conference or other official agency of a recognized denomination to serve as a student pastor. The student must have the approval of the Director of Field Work, as agent to the Dean, before accepting an appointment as a

student pastor. All *new* student pastors must participate in an orientation and training program. Student pastors ordinarily enroll for not less than seven nor more than ten hours per semester, thus requiring, in most cases, four academic years to complete the Master of Divinity degree. If the charge being served is located beyond 50 to 55 miles from the campus, the student is required to live in Durham or vicinity during the academic week, Monday 12:00 noon through Friday 4:00 p.m. Salaries and other forms of support are arranged by church officials in keeping with denominational policies and are reported to the Divinity School if this type of financial aid is wanted. (A student pastorate may become a field education assignment when the conditions set forth in paragraph 1 or 2 under the section on Field Education have been met.)

4. *Other Church-Related Positions.* These consist of teaching church school classes and counseling youth groups and are expected to require no more than three to six hours per week. These positions may not involve remuneration or grants, but sometimes do.

Field Work Supervision. The Director of Field Work Placement will arrange for suitable supervision as circumstances and resources demand and will allow.



Programs of Continuing Education

Divinity School Seminars

Each year the Divinity School, with the support of the James A. Gray Fund, and in cooperation with the United Methodist Conference Boards of Ministry, conducts a series of extension or regional seminars. To these seminars are invited Duke alumni and other ministers, both professional and lay. These annual events operate as workshops for pastors and other church leaders. Leadership for the seminars include faculty representatives from Duke and other institutions as well as prominent churchmen from the region.

During the academic year, 1969-70, two regional seminars were held as follows: Richmond, Virginia, at Trinity United Methodist Church, November 17 and 18; Columbia, South Carolina, at College Place United Methodist Church, November 20 and 21. The subject for the 1969-70 seminars was, "Salvation Now." All the faculty leaders came from Duke. They were: Dr. Robert E. Cushman, Dean of the Divinity School; Dr. Frederick Herzog, Professor of Systematic Theology; and Dr. Thomas A. Langford, Chairman of the Department of Religion.

The Henry Harrison Jordan Loan Library

Henry Harrison Jordan, distinguished member of the Western North Carolina Conference (1862-1931) was memorialized by his children in the establishment of an endowment in 1947. The Divinity School librarian is the custodian of books purchased under this fund for loan, through postal services, to qualified ministers of all denominations or localities. The Jordan Loan Library undertakes to maintain a catalogue of up-to-date publications representative of the several theological disciplines and areas of the minister's professional interest. Books are loaned on application to the librarian of the Divinity School from a catalogue supplied upon request.

Divinity School Summer Clinics

Five clinics, running concurrently, for ministers, wives, and church leaders of all denominations will be conducted at the Duke Divinity School, August 3-13. These are designed to supplement seminary education through two weeks of intensive training in one selected subject. No academic credit is given. Participants are expected to attend the full two weeks from the opening dinner to the closing luncheon.

Clinics for the summer of 1970 are: Pastoral Care, Preaching, Parish Analysis, Programming and Staffing, and The Contemporary Parsonage.

The cost is as follows:

Registration Fee \$10.00 Tuition \$60.00

Air Conditioned Dormitory Room

Single, two weeks \$34.00

Double, two weeks \$25.00

Meals in Cafeteria

Sponsoring institutions make available funds for tuition. Other scholarships are available upon request.

For full information: Write to The Director, Summer Clinics, Duke Divinity School, Durham, North Carolina 27706.

The Course of Study School

In cooperation with the Department of Ministry of the Board of Education and the Southeastern Jurisdictional Conference of The United Methodist Church, Professor O. Kelly Ingram directs for the Divinity School a Course of Study School for pastors of The United Methodist Church. This school is in session for approximately four weeks each

summer, and the required studies for one full year can be completed in this period. This is not a part of the regular work of the Divinity School and no credit toward a seminary degree can be earned. The faculty includes representatives from the Divinity School and other church-related institutions. The twenty-second session of the Course of Study School is scheduled for July 6-31, 1970.

Other Programs

Facilities for Advanced Study in the American Schools of Oriental Research

The Divinity School of Duke University is one of the supporting members of the American Schools of Oriental Research. Accordingly, students in the Divinity School have the privilege of attending the American School in Jerusalem or the one in Bagdad without charge for tuition. They may also compete for the financial aids which are offered annually by these Schools, which consist of four fellowships, the stipends depending upon available funds.

Programs in Pastoral Psychology

Programs in Pastoral Psychology beyond the studies incorporated in the M.Div. curriculum are provided in cooperation with the Duke University Medical Center. Four such special programs are available:

1. The Master of Theology degree with a major in Pastoral Psychology is ordinarily a calendar year program beginning the first full week in June. However, upon the recommendation of the staff, candidates with a quarter or more of clinical training may begin their program in September. Majors choose between a program which emphasizes Clinical Pastoral Education in the institutional setting and one which emphasizes Pastoral Care and Counseling under supervision in the parish setting. The CPE program provides certified training through the Association for Clinical Pastoral Education; the Pastoral Care and Counseling program provides supervised training toward certification by the American Association of Pastoral Counselors. In either case, a quarter of clinical training (PP 227A or its equivalent) is considered a prerequisite. Candidates who emphasize CPE in the institutional setting receive four quarters of clinical training credit if their program extends over the calendar year.
2. A summer quarter of CPE is available beginning the first full week in June for qualified M.Div. candidates.
3. A one-year certificate or non-degree internship program in CPE is

available through the Duke Medical Center for those who hold the M.Div. or equivalent degree. These trainees may enroll in the Divinity School as special students for a course or two each semester. Such training provides four quarters of CPE credit.

4. A two-week clinic in pastoral care is provided each summer as part of the Divinity School's continuing education program for persons with the M.Div. or equivalent degree.

For further information concerning any of these programs, write to Dr. Richard A. Goodling, Director, Programs in Pastoral Psychology, Duke Divinity School. See Master of Theology degree program, p. 20.



Resources for Study

Library Resources

Divinity School Library

The Divinity School Library, containing a collection of more than 145,000 volumes in the field of religion and closely related disciplines, affords an unusual wealth of material for the seminary student. Although it is an integral part of the University's nine-unit library system, which possesses more than 2,100,000 volumes, the Divinity School Library has its own separate facilities in the Divinity School building. Its book collection is operated on the open stack system, and its reading rooms provide study facilities for students, housing space for the special reference collection in religion and for the current numbers of the more than 500 religious periodicals to which the library subscribes.

Staffed by a librarian and a reference librarian who are trained in theology as well as in library administration, and by a circulation staff of two persons aided by a number of student assistants, the Divinity School Library offers a variety of reference services to assist the student in selecting and locating materials. The staff, in cooperation with the faculty, maintains a book and periodical collection to support both basic courses and advanced research in all major fields of religious studies.

The Divinity School Library is adjacent to the Perkins Library, thus affording easy access to its many departments. The seminary student is permitted to withdraw books from the collection of more than 1,300,000 volumes in the Perkins Library, and to make use of its other resources and facilities which include manuscripts, archives, public documents, newspapers, periodicals, microfilms, maps, rare materials (among which are forty-seven prized ancient Greek manuscripts), reference assistance, and provision for the borrowing of books not in the Duke libraries from the Library of the University of North Carolina and other institutions.

Ormond Memorial Fund. Established in 1924 by Dr. J. M. Ormond, '02, and Mrs. Ormond, in memory of his mother and father, Mr. and Mrs. J. J. Ormond, the income from the Ormond Memorial Fund is to be used for the purchase of a collection of books on the rural church for the Library of the Divinity School at Duke University.

Avera Bible Fund. Established in 1895 by gift of Mrs. L. B. McCullers in memory of her husband, Willis H. Avera, the fund provides for the purchase of books to be used for the Divinity School Library.

Louis W. Bailey Memorial Fund. This memorial fund was established in 1958 by the Reverend A. Purnell Bailey in memory of his father. The income is to be used for books for the Divinity School Library.

The William Arthur Kale, Jr. Memorial Fund. William Arthur Kale, Jr. was a member of the Duke University Class of 1958, a lover of sacred art and music, and a member of the University Chapel Choir. In his memory, there was established in 1964, by the provision of his parents, Professor and Mrs. William Arthur Kale, Sr., a fund for the purchase of books and other materials in the area of fine arts and religious musicology for the perpetual enrichment of the holdings of the Divinity School Library.

Corporate Worship

One of the most important aspects of a program of training for Christian service is warm and discriminating common prayer.

The center of corporate life of the Divinity School has been its own place of worship, York Chapel. Due to current construction for renovation of library facilities, Divinity School worship is conducted in the great Chapel of the University. Regular chapel services are held, at which all students are expected to be present. Services are led by members of the faculty, by visiting ministers, and by members of the student body. Each spring, the Worship Committee invites a Duke alumnus to return to the Divinity School for a week to share, through Chapel sermons and seminar discussions, his experience of the challenges and possibilities of the parish ministry.

Public Lectures

The Committee on Lectures and Public Events presented or sponsored the following lectures during the year 1969-1970: Professor David Daube, Regius Professor, Civil Law, All Soul's College, Oxford; Gordon S. Wakefield, Editor, *Epworth Press*, London; Professor Ulrich B. Simon, King's College, University of London; Professor Preston Williams, Boston School of Theology.

Lectures and Symposia

The James A. Gray Lectureship

The James A. Gray Lectures were established in 1950 as part of the fund set up in 1947 by Mr. James A. Gray of Winston-Salem, North Carolina. This lectureship was once again delivered in connection with the Divinity School Convocation and Pastors' School, held at the University on October 27-29, 1969. The lecturer was Dr. Ian G. Barbour, Chairman of the Department of Religion and Professor of Physics, Carleton College, Northfield, Minnesota. His subject was "Science and the Death of God: Challenges to Theology."

The Divinity School Library Lectureship

In 1948 the Duke Divinity School Library Lectureship was established by the Reverend George B. Ehlhardt for the purpose of bringing to the Divinity School a succession of religious leaders.

Franklin Simpson Hickman Lectureship

The Franklin Simpson Hickman Lectureship was established in July, 1966, by Veva Castell Hickman, the widow of Dr. Franklin Simpson Hickman. The first Hickman lecture was delivered by Dr. Roy Nichols, Resident Bishop of the Pittsburgh Area of the United Methodist Church, at the time of the 1968 Convocation and Pastors' School.

The second Hickman lecturer was Dr. Browne Barr, minister of the First Congregational Church, Berkeley, California, who delivered two lectures at the time of the 1969 Convocation and Pastors' School.

Symposium of Christian Missions

Each year, in collaboration with the United Methodist Board of Missions, the Divinity School presents a team of distinguished participants in the world mission of the Church, usually including a secretary of mission-

ary personnel and a Duke alumnus serving overseas. The general aims are "to inform students and faculty of the philosophy and work of missions as seen through the personal experience of speakers; to educate present and future ministers so that they will have a vital concern for the promotion of missionary education in the local church; and to evaluate the missionary enterprise as a significant force in the revolutionary world." The featured speaker in 1970 was The Reverend Tracy K. Jones, Jr., General Secretary for the United Methodist Board of Missions. He spoke on "Frail Methodist Churches on a Turbulent World Sea."



Courses of Instruction*

Required courses are numbered from 11 to 70. Elective courses carrying credit in the Divinity School only are numbered from 71 to 199. Courses approved for credit in both the Divinity School and the Graduate School are numbered above 200. Lists of courses to be offered in any semester will be available at the time of each registration.

Junior Seminars, Colloquia, and English Bible

9. *Church and Ministry*. Interdisciplinary seminars for juniors, relating current theological discussion to the students' situations in the church and the world. 2 s.h. Staff

10. *Person and Society*. 2 s.h. Staff

Junior Colloquium, I. Unstructured dialogue group for juniors. No credit. Staff

Knowledge of the content of the English Bible is regarded as indispensable for fulfillment of conditions for the basic theological degree. Provision for review of these materials will be integral to the Old and New Testament introductory courses.

*On approval of the Dean, courses offered in the Graduate School other than those approved for credit in the Divinity School may be approved for credit in individual cases, provided no equivalent course is offered in the Divinity School; each case to be decided on its merits.

I. Biblical Studies

Old Testament

11. *Introduction to Old Testament Interpretation*. An introduction to the literature, background, and theology of the Old Testament with special attention to the perspectives and methods of historical-critical study. Emphasis on pre-Exilic literature. 4 s.h. *Staff*

12. *Introduction to the Old Testament*. Introduction to an interpretation of Exilic and post-Exilic prophecy, Psalms, wisdom literature, the Chronicler, apocalyptic, and the Apocrypha. 3 s.h. *Efird or Stinespring*

101. *Post-Exilic Prophecy*. A study of the post-Exilic prophets from Ezekiel to Daniel, with special reference to Messianic prophecy and related theological problems. 2 s.h. *Stinespring*

106. *Exegesis of the English Old Testament*. A. A book of the Pentateuch; B. A prophetic book; C. A historical book; D. Selected poetical materials. (O.T. 106 A, O.T. 106 B, O.T. 106 C, and O.T. 106 D are separate courses, offered in different semesters.) Prerequisite: O.T. 11 or the equivalent. 3 s.h. *Staff*

109. *The Religion of the Old Testament*. A study of the religious ideas contained in the Old Testament with special reference to their interpretation from Robertson Smith to the present. (Not offered in 1970-71.) 3 s.h. *Efird*

196. *The Bible and Recent Discoveries*. A survey of the contribution of the cultural setting of the Bible as an aid to its understanding. 2 s.h. *Stinespring*

201-202. *First Hebrew*. The principles and structure of the Hebrew language with translation of selected Old Testament narratives. One year of Greek prerequisite. 6 s.h. *Stinespring*

207. *Second Hebrew*. Historical Hebrew grammar with reading and exegesis of Old Testament prose (Pentateuch and historical books in alternate years). First semester. 3 s.h. *Staff*

208. *Second Hebrew*. Historical Hebrew grammar with reading and exegesis of Old Testament poetry (Prophets and the Writings in alternate years). Second semester. 3 s.h. *Staff*

209. *Old Testament Theology*. Studies of the Old Testament in regard to theological themes and content. Prerequisite: O.T. 11-12 or equivalent. 3 s.h. *Staff*

302. *Studies in the Intertestamental Literature*. Selected documents of the Apocrypha and Pseudepigrapha examined exegetically and theologically in their relation to post-Exilic Judaism. Prerequisite: permission of the instructor. 3 s.h.

304. *Aramaic*. A study of the Aramaic portions of the Old Testament, and selected passages from later Aramaic texts. 3 s.h. *Stinespring*

305. *Third Hebrew*. An interpretative study of late Hebrew prose, with readings from Chronicles, Ecclesiastes, and the Mishnah. 3 s.h. *Davies or Stinespring*

306. *Language and Literature of the Dead Sea Scrolls*. A study in interpretation. Prerequisite: a knowledge of Hebrew. 3 s.h. *Wintermute*

307. *Syriac*. A study of the script and grammar, with readings from the Syriac New Testament and other early Christian documents. Some knowledge of Hebrew and Aramaic prerequisite. 3 s.h. *Stinespring*

309. *History of the Ancient Near East*. A specialized study of the civilizations of Egypt, Palestine, Syria, and Mesopotamia in the light of Biblical archaeology. 3 s.h. *Staff*

310. *Old Testament Prophecy*. The prophetic movement in Israel with special emphasis on the theological standpoint of the prophets of the eighth century B.C. Prerequisites: O.T. 11 or equivalent. 3 s.h. *Stinespring*

350-351. *Seminar in Old Testament*. Research and discussion on selected problems in the Old Testament and related fields. 3 s.h. *Staff*

New Testament

18. *Introduction to New Testament Interpretation*. An introduction to the literature of the New Testament with special attention to the perspectives and methods of historical-critical investigation and interpretation. 4 s.h. *Efrid or M. Smith*

19. *Introduction to New Testament Theology*. A constructive treatment of the theology of the New Testament or one of its major themes. Prerequisite: N.T. 18. (Not offered in 1970-71.) 3 s.h. *M. Smith*

103-104. *Hellenistic Greek*. Designed for beginners to enable them to read the Greek New Testament. 6 s.h. (Two sections.) *Staff*

105. *Studies in Paul*. An investigation of Paul's apostolate based upon the Acts and the Epistles with attention to Paul's theology as reflected in selected passages. (Not offered in 1970-71.) 3 s.h. *Efrid*

107. *The Church in the New Testament*. An exegetical consideration of the important New Testament texts relevant to the development of church order, ministry, sacraments, and/or other important dimensions of the primitive community and its self-consciousness. Prerequisite: N.T. 18. or equivalent. (Not offered in 1970-71.) 3 s.h. *M. Smith*

116. *Exegesis of the English New Testament I*. A. Luke-Acts; B. Galatians and I Corinthians; C. The Pastoral Epistles; D. II Corinthians. (N.T. 116 A, N.T. 116 B, N.T. 116 C, and N.T. 116 D are separate courses, offered in different semesters.) 3 s.h. *Staff*

117. *Exegesis of the English New Testament II*. A. The Gospel and Epistles of John; B. Romans. C. Revelations (N.T. 117 A, N.T. 117 B, and N.T. 117 C are separate courses, offered in different semesters.) 3 s.h. *Staff*

118. *The New Testament in Greek*. Readings in the Gospels. 3 s.h. Staff

119. *The New Testament in Greek*. Readings in the Epistles. 3 s.h. Staff

225. *Living Issues in New Testament Theology*. Critical examination of major problems and issues in New Testament interpretation and Theology. Prerequisite: 6 s.h. of N.T. or the equivalent. 3 s.h. M. Smith

226. *Exegesis of the Greek New Testament I*. A. Mark and Matthew; B. Romans; C. Colossians and Ephesians; D. II Corinthians. (N.T. 226 A, N.T. 226 B, N.T. 226 C, and N.T. 226 D are separate courses, offered in different semesters.) Prerequisite: N.T. 103-104. 3 s.h. M. Smith or Young

227. *Exegesis of the Greek New Testament II*. A. Luke-Acts; B. Galatians and I Corinthians; C. The Pastoral Epistles; D. The Apocalypse. (N.T. 227 A, N.T. 227 B, N.T. 227 C, N.T. 227 D are separate courses, offered in different semesters.) Prerequisite: N.T. 103-104. 3 s.h. M. Smith or Young

258. *Coptic*. Introduction to the Sahidic dialect with selected readings from Christian and Gnostic texts. Prerequisite: at least one year of Greek. 3 s.h. Wintermute

312. *Pauline Theology*. Studies in aspects of Paulinism in the light of recent scholarship. 3 s.h. (Not offered in 1970-71.) Davies

314. *Judaism and Christianity in the New Testament*. Their interaction. (Not offered in 1970-71.) 3 s.h. Davies

319. *The Gospel According to St. Matthew in Recent Research*. 3 s.h. Davies

340-341. *Seminar in the New Testament*. Research and discussion on a selected problem in the Biblical field. 3 s.h. M. Smith

345. *The Epistle to the Hebrews in Recent Research*. See also Third Hebrew p. 55. 3 s.h. Davies

*Greek 257. The social and cultural history of the Hellenistic world from Alexander to Augustus. 3 s.h.

*Latin 258. The social and cultural history of the Graeco-Roman world. 3 s.h.

II. Historical Studies

Church History

13, 14. *History of Christianity I-II-III*. History of the Christian church from its beginning until the present time. Special emphasis on selected

*Course offered in the Graduate School which is credited toward the degree of Master of Divinity.

themes from Patristic, Medieval, Reformation, Modern, and American phases of Christianity. (Full year sequence.) 8 s.h. *Staff*

137. *Religious Leaders in Christian History*. Representative leaders in the early and medieval church studied in relation to contemporary churchmanship. Prerequisite: C.H. 13. 3 s.h. *Petry*

138. *Great Books in Christian History*. An intensive study of Augustine's *Confessions*, Thomas à Kempis' *Imitation of Christ*, Erasmus's *Complaint of Peace*, Luther's *Christian Liberty*, Calvin's *Instruction in Faith*, and Andrewes' *Private Devotions*. (Not to be offered in 1970-71.) 3 s.h. *Petry*

139. *Methodism*. A study of Methodist societies in England and the developing church in America as they gave rise to such historic issues as polity, education, division, and reunion. Prerequisite: C.H. II. 2 s.h. *Petry and Baker*

140. *The Rise of Methodism and the Anglican Background*. The Methodist societies within the Church of England to the death of Wesley. For seniors. 3 s.h. *Baker*

(Students are advised that either C.H. 139 or C.H. 140 will satisfy the United Methodist Discipline Requirement No. 344.)

142. *British Methodism after Wesley*. British Methodism in its nineteenth and twentieth century development. (Not offered in 1970-71.) 3 s.h. *Baker*

187. *Pre-Reformation Preaching*. (See C.W. 187.)

329. *The English Church in the Eighteenth Century*. Studies of Christianity in England from the Act of Toleration, 1689, to the death of John Wesley, 1791. 3 s.h. *Baker*

330. *The Church in Europe Since 1800*. Emphasis is placed on the relation of the church to the social, economic, and political life of modern Europe. Particular attention is given to Papal pronouncements on social issues, the relationship of Eastern to Western institutions, an ecclesiastical historiography as it involves source editions, periodicals, and ecumenical literature. 3 s.h. *Petry*

331. *The Social Message of the Early and Medieval Church*. A study of the social teachings and contribution of the Christian church prior to the Protestant Reformation. Prerequisite: C.H. I, II. 3 s.h. *Petry*

332. *The Medieval Church*. Outstanding characteristics of the medieval church, emphasizing theory, polity, institutions, sacraments, and worship. Prerequisite: C.H. 13. 3 s.h. *Petry*

334. *Church Reformers and Christian Unity*. The work of such reformers as Marsilius of Padua, William of Ockham, Jean Gerson, Pierre d'Ailly and Nicholas of Cusa in relation to ecclesiastical schism and the search for Christian unity through representative councils. Prerequisite: C.H. 13. 3 s.h. *Petry*

336. *Christian Mysticism in the Middle Ages*. Source studies, in

historical perspective of such late medieval mystics as Bernard of Clairvaux, the Victorines, Ramon Lull, Meister Eckhart, Richard Rolle, Catherine of Siena, and Nicholas of Cusa. Prerequisite: C.H. I-II. 3 s.h.
Petry

Historical Theology

21. *The Theology of the Protestant Reformation*. The Reformation of the 16th century and its outcome in the 17th and 18th centuries. 3 s.h.

111. *Literature of the Latin Church*. Readings, in the Latin originals, of diverse kinds of writing produced by the Latin church in various periods of its history. 3 s.h.

120. *Faith and Heresy in the Early Church*. Studies in the origin and role of the Apostles', the Nicene, and the Chalcedonian Creeds in their contemporary setting. 3 s.h.

121. *Sacraments in the Christian Church*. Ecumenical studies in devotion and division: Baptism and the Lord's Supper. 3 s.h.

123. *The Theology of the Early Church*. An introduction to the history of doctrine from the second to the sixth centuries. 3 s.h.

234. *The Theology of St. Thomas Aquinas*. A systematic interpretation of the thought of St. Thomas, with major emphasis on his specifically theological formulations, drawing upon the *Summa Theologica* and other relevant sources. 3 s.h.

260. *Life and Thought of the Wesleys*. A seminar on John and Charles Wesley and their colleagues in relation to English culture and religion in the eighteenth century. Permission of instructor. (Not offered in 1970-71.) 3 s.h. *Baker*

261. *The Theology of John Wesley*. A study of the development and structure of Wesley's theology, with special reference to his doctrines of man and salvation. 2 s.h. *Richey*

308. *Greek Patristic Texts*. Critical translation and study of selected Greek texts illustrative of significant aspects of patristic theology and history from the second through the fifth century A.D. Prerequisite: permission of instructor. 3 s.h.

American Christianity

28. *History of American Christianity*. A consideration of the nature of Christianity in America and the history of its development. 3 s.h. *Henry*

199. *The American Social Gospel*. A study of Protestant social thought and action in America since 1865. 3 s.h. *Henry*

296. *Religion on the American Frontier*. A study of the spread of evangelical Christianity as a theological and cultural phenomenon of the American West. 3 s.h. *Henry*

385. *Religion in American Literature*. A critical study of the meaning

and value of religious motifs reflected in American literature. 3 s.h. *Henry*

395. *Christian Thought in Colonial America*. Exposition of the main currents in Protestant theology. 3 s.h. *Henry*

396. *Liberal Traditions in American Theology*. A study of the main types of modern religious thought, beginning with the theology of the Enlightenment. 3 s.h. *Henry*

397. *Contemporary American Theology*. A critical appraisal of major tendencies. 3 s.h. *Henry*

384. *Religious Dissent in American Culture*. History and significance of dissent in the theology and culture of America. 3 s.h. *Henry*

History of Religions

158. *Contemporary Non-Christian Religions*. Critical consideration of contemporary conditions in major non-Christian traditions, with special reference to Hinduism, Buddhism, Islam, and African Religions. 3 s.h.

180. *Religions of the Near East*. Historical and theological introduction to the major indigenous traditions of the Near East, especially Zoroastrianism and Islam. 3 s.h. *Partin*

182. *Religions of India*. Historical and theological introduction to Indian religious life and thought. The development of Buddhism is covered, as well as Jainism and Sikhism, along with the various modes of Hinduism. 3 s.h.

280. *The History of Religions*. A study of the methodology of the history of religions, the nature of religious experience and specific categories of religious phenomena. Permission of instructor. 3 s.h. *Partin*

III. Theological Studies

Christian Theology

32. *Introduction to Christian Theology*. The major themes of the theology of the church. 4 s.h. *Cushman and Herzog*

100. *Black Power and Black Religion*. A critical analysis of the recent rise of black consciousness in America and its significance in the theological preparation of the Christian ministry. 3 s.h. *Cousin and Herzog*

108. *Major Trends in Contemporary Theology*. A study of recent developments in theology, such as nonreligious theology, hermeneutic theology, and death of God theology, in the light of revelation and authority. 3 s.h. *Herzog*

125. *Theology and the Study of Man*. A comparative study of representative theological and psychological interpretations of man's nature, predicament, and deliverance. 3 s.h. *Richey*

127. *Contemporary Understandings of Man*. A seminar on selected recent and current interpretations of human nature and the human situation. 3 s.h. *Richey*

200. *The Person and Work of Christ*. The problem of knowledge of Christ and formulation of a doctrine of his work and person in the light of Biblical eschatology. Prerequisite: C.T. 32. 3 s.h. *Cushman or Hall*

213. *The Structure of Roman Catholic Thought*. The main characteristics of Roman Catholic theology with consideration of possibilities and limitations in ecumenical conversation with Rome. Prerequisites: C.H. 13 and 14. 2 s.h. *Herzog*

215. *The Nature and Mission of the Church*. Christian understandings of the church, Biblical, historical, contemporary, with a view toward ecumenical doctrinal construction. 3 s.h. *Hall*

216. *Kierkegaard Studies*. Critical examination of selected works. 3 s.h. *Robinson*

224. *Conceptions of Man in Western Thought*. An analysis and interpretation of important types of philosophical and theological theory. (Not offered in 1970-71.) 3 s.h. *Richey*

300. *Systematic Theology*. Method and structure of systematic theology, the doctrine of God, theological anthropology, and Christology. Prerequisite: C. T. 32 or equivalent. 3 s.h. *Herzog*

303. *The New Hermeneutic and the Concept of History*. A critical examination of key issues in present-day European systematic theology centered in the positions of Fuchs, Ebeling, Moltmann, Ott, and Pannenberg. Prerequisite: C.T. 32. 3 s.h. *Herzog*

320. *Hegel and Schleiermacher*. A study of two makers of modern Protestant thought. 3 s.h. *Herzog*

322. *Nineteenth-Century European Theology*. Protestant theology from Kant to Herrmann. 3 s.h. *Herzog*

325. *Philosophical Theology I*. Main problems in the history of philosophical theology from the pre-Socratics to Descartes. Prerequisite: permission of instructor. 3 s.h. *Robinson*

326. *Philosophical Theology II*. Main problems of philosophical theology in the modern period. Prerequisite: C.T. 325 or permission of instructor. 3 s.h. *Robinson*

328. *Twentieth-Century European Theology*. Critical examination of the thought of selected Protestant theologians from 1900 to 1950. Prerequisite: C.T. 32 and permission of the instructor. 3 s.h. *Herzog*

372. *Theology of Paul Tillich*. An examination of Tillich's philosophical theology. 3 s.h. *Robinson*

Christianity and Culture

20. *Types of Religious Philosophy*. Basic historical orientation of religious thought, especially in Western culture. 3 s.h. Robinson

102. *Christian Apologetics and Modern World Views*. A constructive approach to the Hebrew-Christian understanding of Creator and creature in the light of contemporary scientific knowledge. 3 s.h. Robinson

110. *This Life and the Age to Come*. Christian eschatology and the meaning of history in the light of God's triumph over sin, suffering, and death. 3 s.h. Robinson

229. *Tragedy and Christian Faith*. An analytical and constructive philosophical interpretation of the fundamental tragic dimensions of human life in the light of a Christian theological understanding. 3 s.h. Robinson

Christian Ethics

All courses in Christian Ethics numbered 200 or above require a prerequisite of Ch.E 33 or permission of the instructor.

33. *Introduction to Christian Ethics*. Theological assumptions, ethical principles, and their application to contemporary issues of Christian social policy. 3 s.h. Beach, Lacy, and H. Smith

113. *Contemporary Issues in Christian Morals*. Constructive examination of selected areas of public and private morality. 3 s.h. H. Smith

115. *Christian Social Action in the Local Church*. Christian ethical principles, resources, procedures, and programs for pastoral leadership in parish social action. 2 s.h. H. Smith

122. *Moral Theology in the Nineteenth Century*. Critical and comparative examination of ethical theory as exhibited in the work of representative theologians. 3 s.h. H. Smith

190. *The Christian Critique of Communism*. Analysis of and alternatives to the dynamic secular ideology from a religious standpoint. (Not offered in 1970-71.) 3 s.h. Lacy

194. *The Protestant Church and American Culture*. Analysis from the perspective of Christian ethics of current problems in the interpenetration of Church and culture with explicit reference to the parish setting. 3 s.h. H. Smith

292. *Christian Ethics and International Relations*. An examination of Christian attitudes toward such issues as war and peace, the rule of law, foreign aid, and human rights; and the Church's contribution to international policies and institutions. (Not offered in 1970-71.) 3 s.h. Lacy

333. *Seminar: Marxist Ideology and Christian Faith*. Comparative study of Communist and Christian doctrines of man, society, sin, history, ethics, and eschatology. Prerequisite: Ch.E. 190 or equivalent. 3 s.h. Lacy

383. *Moral Theology in the Twentieth Century*. Critical and comparative examination of ethical theory as exhibited in the work of selected contemporary theologians. 3 s.h. *H. Smith*

388. *Ethics and Medicine*. A critical study of selected aspects of modern biomedical technology with special reference to the ethical assumptions informing their development and practice. 3 s.h. *H. Smith*

389. *Christian Ethics and Contemporary Culture*. A study of the interaction between Christian thought and current secular social theory. Prerequisite: permission of instructor. 3 s.h. *Beach*

390. *Current Problems in Christian Ethical Theory*. A critical study of dominant issues in Christian Ethics, through an analysis of contemporary Christian treatments of such problems as love, justice, community, and conscience. Prerequisite: permission of instructor. 3 s.h. *Beach*

391. *Historical Types of Christian Ethics I*. A critical study of representative statements of Christian ethical theory through the early Reformation. Prerequisite: permission of instructor. (Not offered in 1970-71.) 3 s.h. *Beach*

392. *Historical Types of Christian Ethics II*. A continuation of Ch.E. 391, from the Reformation through current Christian ethical theory. (Not offered in 1970-71.) 3 s.h. *Beach*

394. *Christianity and the State*. The relation of the Christian theory of the State to political problems with special consideration of the religious assumptions underlying democratic theory and practice, and of the relationship of Church to State. Prerequisite: permission of the instructor. 3 s.h. *Beach*

World Christianity and Ecumenics

24. *The Christian World Mission*. A study of theological foundations, guiding principles, and contemporary problems of the World Christian Community. 3 s.h. *Lacy*

133. *The Expansion of Christianity*. A survey of the spread of Christianity and the growth of the church with special emphasis on 19th and 20th century Protestantism in the non-Western World. 3 s.h. *Lacy*

135. *Area Studies of the Christian Church*. The cultural setting and current programs and policies of the Church in one of the following areas: (a) Latin America, (b) India and Pakistan, (c) Africa, (d) Southeast Asia, (e) Japan-Korea-Philippines, (f) Moslem Lands, or (g) United States Home Missions. (One of these areas may be taken as an independent reading course, WC 399 when not offered as a seminar.) 3 s.h. *Lacy and Others*

156. *The Ecumenical Movement*. Its contemporary development, structures, activities and problems, against the background of Church unity and disunity. (Not offered in 1970-71.) 3 s.h. *Lacy*

386. *Seminar: Christianity in Dialogue with Other Faiths*. Contemporary

currents of Christian thought as they relate to resurgent non-Christian religions and involve new formulations of a theology of mission. 3 s.h. *Lacy*
See Also: Ch.E. 190, Ch.E. 292, and Ch.E. 333.

IV. Ministerial Studies

The Care of the Parish

146. *Church Building*. The role of the pastor in planning and executing building programs in the local church: architectural considerations and counsel, building requirements and plans. 2 s.h. *Nesbitt*

148. *Christian Stewardship and Church Finance*. A seminar to consider the principles of stewardship education, budget making, enlistment in church support. 2 s.h. *Ingram*

150. *Church and Community*. The structure and dynamic factors shaping the present-day community together with their import for the work of the Church. 2 s.h. *Wilson*

151. *The Town and Country Church*. The small church, the circuit church, circuit administration, larger parish and group ministry, and the Town and Country movement. 2 s.h. *Nesbitt*

152. *Evangelism and the Local Church*. A study of the nature, purposes and methods of contemporary Christian evangelism with special attention to the local church. (Not offered in 1970-71.) 2 s.h. *Kale and Ingram*

153. *Comparative Polity and Ecumenics*. A study of selected examples of church polity as represented in the Catholic and Protestant traditions in relation to present-day ecumenical developments. (Not offered in 1970-71.) 3 s.h. *Ingram*

154. *The Urban Church*. The function, nature, program, and administration of the effective city church and of the urban minister's distinctive task. 2 s.h. *Ingram*

155. A, B, C, D. *Church Organization and Administration*. Church structure and organization with consideration of administrative procedures appropriate for the local church. (Students may take the first two-thirds of the course, thus meeting denominational requirements for polity, in which case they will receive 2 s.h.)

A. *The United Methodist Church*. 2 or 3 s.h. *Ingram*

B. *The Baptist Churches*. 2 or 3 s.h. *Ingram and Others*

C. *The United Church of Christ*. 2 or 3 s.h. *Ingram and Others*

D. *The Presbyterian Churches*. 2 or 3 s.h. *Ingram and Others*

160. *Church Administration*. A course for student pastors providing an introduction to the principles of church administration, supervised experience in the parish setting, and reflection on selected case studies. 3 s.h. *Ingram*

179. *Seminar on Church Research*. Methods of research and survey for the gathering, analysis, and interpretation of church and community data, together with preparation and use of denominational statistics. 3 s.h. *Wilson*

Christian Education

22. *Faith and Nurture*. Foundations in theology and educational theory for the teaching ministry of the Christian community. (Not offered in 1970-71.) 3 s.h. *Richey*

25. *The Church and Christian Nurture*. A constructive survey of the local church as a community of Christian nurture: Statement and evaluation of objectives, leadership and resource materials, structural patterns and administrative and supervisory procedures for the church school. 3 s.h. *Kale*

149. *The Ministry to the Campus*. An examination of the circumstances which have produced, and the unique problems which confront, the ministry on the campus, considered from the perspective of the Christian idea of higher education. 3 s.h. *Staff*

161. *Method in Teaching-Learning*. Basic teaching procedures required by professional and lay workers in the local church. Opportunities are arranged for observation and guided practice. Usually required for candidates for the M.R.E. degree. 3 s.h. *Kale*

162. *Curriculum Building in the Local Church*. An examination of influential theories of and contemporary trends in curriculum construction, together with an evaluation of existing curricula. Actual designing of short units for use in the local church. 3 s.h. *Kale*

164. *Christian Education of Children*. The organization and administration of the work of the church with pre-school and elementary-age children. 2 s.h. *Kale*

165. *Christian Education of Youth*. The organization and administration of the youth program in the local church. 2 s.h. *Kale*

166. *Christian Education of Adults*. A study of the needs of adults; the materials, methods, and principles of organization for the Christian education of adults. 2 s.h. *Kale*

167. *Theology and the Laity*. A study of contemporary lay movements and centers, the ministry and mission of the laity in Church and world, and the ministry of teaching in the lay renewal of the Church. 3 s.h. *Richey*

169. *Major Issues in Christian Education*. Critical examination of selected issues in Christian education. (Not offered in 1970-71.) 3 s.h. *Richey*

M.R.E. Thesis or Project. Required of all candidates for the Master of Religious Education degree. 3 s.h. *Kale and Others*

Pastoral Psychology

170. *Pastoral Conversation*. A consideration of the nature of the pastor's conversation with people in his total caring ministry grounded in the person-centered understanding of personality processes and human relationships, using textual and conversational materials. 3 s.h. *Goodling*

171. *Pastoral Counseling*. Consideration of the structures and processes of pastoral counseling: pastoral evaluation, referral, intake, contract, goals, transference, termination, and other special problems. Prerequisite: P.P. 177. 3 s.h. *Staff*

172. *Pastoral Care in Marriage and Family Life*. Pastoral care in marriage and family life with special emphasis on premarital guidance within the context of the local church's program of family life education. 2 s.h. *Goodling*

174. *Religion and Personality Processes*. Psychological and religious interpretation of man's basic experiences; personality factors in religious development; psychodynamic meanings and uses of religious beliefs and practices. Prerequisite: P.P. 170. 3 s.h. *Goodling*

175. *Special Practicum Projects*. For advanced students who want additional clinical experience under supervision in a pastoral care setting (inner-city; alcoholic rehabilitation; counseling; etc.) *Staff*

176. A, B, C. *Pastoral Care and Persons in Institutions*.

A. Lectures by staff and ward visits at the Dorothea Dix State Hospital in Raleigh (and related facilities: Alcoholic Rehabilitation). 3 s.h. *Staff*

B. Lectures by staff and ward visits at the Murdoch Center for the Mentally Retarded and other facilities in the Butner, North Carolina complex (State Hospital, Alcoholic Rehabilitation, Training School). 3 s.h. *Staff*

C. Lectures by staff and ward visits at the Central Prison in Raleigh (and related correctional facilities). 3 s.h. *Staff*

177. *Pastoral Care in the General Hospital Setting*. An examination, through intensive individual and group supervision, of the student's pastoral ministry to the ill, the dying, and the bereaved in the general hospital setting. Prerequisite: P.P. 170. 3 s.h. *Staff*

178. *The Psychodynamics of the Community Life of the Local Church*. A case study approach to the organizational functioning and life style of the local church community. Admission by consent of the instructor. 2 s.h. *Staff*

271. *Advanced Counseling: Marriage and Family*. The psychodynamics of marital conflict and family problems; principles and procedures in marriage and family counseling. (For Th.M. candidates.) 2 s.h. *Staff*

274. *Research Problems in Pastoral Psychology*. Research methods and areas of investigation in pastoral psychology. 2 s.h. *Goodling*

275. *Individual Study in Pastoral Psychology*. Selected readings in major issues in pastoral psychology issuing in a research or honors paper. 2 s.h. Staff

277 A, B, C. *Clinical Pastoral Education*. CPE in accredited training centers.

A. Summer Quarter of CPE. 4 s.h.

B. Fall Semester of CPE. 4 s.h.

C. Spring Semester of CPE. 4 s.h.

278. *Psychological Theories of Personality*. Systematic review of personality theories (Psychoanalytic, Social Psychological, Organismic, Existential Self-Theory) with special reference to their relevance for the pastoral ministry. 2 s.h. Staff

279. *The Caring Ministry of the Laity Through Personal Groups*. Personal experience in a group counseling process to develop a methodology for training lay leadership in the ministry of pastoral care through group experience. 2 s.h. Staff

281 A, B. *Pastoral Counseling Practicum*. Individual and group supervision of several types of pastoral counseling with people in different crisis and growth situations. The student will be working part time as a minister of counseling in a local church situation. Admission by permission of instructor. 4 s.h. Staff

The Church at Worship

34. *Workshop in Communication*. Intensive drill in voice, diction, speaking, and reading. Enrollment by recommendation of teaching faculty. 1 s.h. Rudin

Preaching

30. *Theory and Practice of Preaching*. The development of a theory of preaching and methods of sermon construction, including clinical experience in preaching sessions and local church settings. 3 s.h. Hall

181. *Advanced Sermon Analysis Seminar*. A critical study, on the basis of selected sermons and student presentations, of principal and practical problems facing the contemporary preacher. 3 s.h. Hall

183. *Preaching in Context*. An analysis of preaching done in the context of the Black religious experience based on audio-video-taped sermons and observations done by students. 2 s.h. Cousin

185. *Preaching Values in Non-Biblical Sources*. A critical examination of select samples of contemporary drama, poetry, and fiction, for homiletical purposes. 3 s.h. Hall and Staff

186. *Twentieth Century Preaching*. A study of contemporary preaching based on printed, recorded, audio- and video-taped sermons of leading homileticians of our age. 3 s.h. Hall

187. *Pre-Reformation Preaching*. Sermons, handbooks, and other his

torical sources studied in relation to Biblical preaching and the liturgical church, the problem of popular ministry and the issues of Christian reform. Prerequisite: C.H. 13. 3 s.h. *Petry*

188. *Post Reformation Preaching*. A study of the theological trends and significant personalities in the preaching tradition from the sixteenth century to the present. 3 s.h. *Carlton*

192. *Homiletical Authenticity and the Communications Arts*. A study of recent developments in the understanding or communications media and the arts with a view to identifying significant contributions to homiletical practice. 3 s.h. *Hall*

193. *Theology and Preaching*. An examination of the relation of systematic theology and homiletical presentation in the sermons of major Christian leaders, past and present. 3 s.h. *Hall*

Worship and Church Music

134. *Liturgical Reading*. Practice in reading the liturgical materials of the pastoral ministry: Scriptures, prayers, and the rites and services in the Methodist *Book of Worship*. 2 s.h. *Rudin*

141. *The Classic Age of the English Hymn*. Eighteenth century development of the English hymn with special reference to Watts and the Wesleys, their precursors and successors. 2 s.h. *Baker*

178. *Corporate Worship*. Study of the liturgical life of the church, celebrated in sacraments, worship, and the church year. Field experiences and vocational application of theory. 3 s.h. *Rudin*

180. *Church Music*. A two-fold study including: (1) a survey of the great monuments of church music; (2) musicianship, songleading and basic conducting; with an emphasis upon the selection and use of hymns and other music, from the *Methodist Hymnal*, in public worship. 3 s.h. *Hanks*

Chapel Choir. Students who successfully complete C.W. 180 before graduation may qualify for credit (to the limit of 2 s.h.) of ½ s.h. for each semester of effective participation in the Chapel Choir. Choir membership (granted by audition) affords opportunity for study of the history and background of church music, and practical consideration of it in the context of public worship. *Hanks*

Field Education Projects, Clinical Training, and Internships

Field Education Projects

Each project involves the quality of preparation and participation commensurate with one semester hour of academic credit. Participation in

any project must have the approval of the supervising professor and the Field Education Office before work is begun. Registration for projects must be at the time of normal Divinity School registration, though work on the project may extend over varying lengths of time. A student may receive credit for a maximum of three projects during his seminary career. Projects in other areas may be proposed by professors or students for consideration by the Field Education and Curriculum Committees.

195. A, B, C, D, E, F. *Field Education Projects*.

A. *Pastoral Psychology Practicum*. Small group seminar to explore personal and professional identity and role performance based on written reports of field encounters. Enrollment limited to students currently engaged in field work situations with separate seminars for students pastors and student assistants. 1 s.h. *Staff*

B. *Community Studies*. Planning and execution of a community religious census, church and community survey, or field research study in consultation with the faculty supervisor. Includes background reading, planning sessions, use of volunteer help where needed, tabulation, interpretation, and overall evaluation. 1 s.h. *Staff*

C. *Leadership Training*. Preparation, teaching, and evaluation of a leadership training course under faculty supervision in collaboration with denominational boards of education. Can be taught in any field location approved by faculty supervisor. 1 s.h. *Kale and Staff*

D. *Christian Education Laboratory*. Controlled educational experience in a local church setting, under supervision, approximating 28-32 hours of participation in planning, leading, observing, and evaluating actual teaching-learning projects related to specific age groups. 1 s.h. *Kale and Staff*

E. *Research in Experimental Ministries*. Assembling data and preparing papers for the use of groups engaged in specialized urban ministries. 1 s.h. *Ingram and Staff*

F. *Community Center Practicum*. Seminar to assist students to integrate work and learning experiences in a community center and to develop a vocational style which displays special relevance for ministry in an inner-city neighborhood. Enrollment limited to those currently engaged in community center experiences. 1 s.h. *H. Smith and Staff*

Clinical Training in Pastoral Psychology

1. Clinical credit may be allowed to students for a quarter (10 or 12 weeks) of training in programs accredited by the Association for Clinical Pastoral Education (ACPE).

2. Credit for clinical training in programs not accredited by ACPE will be on an individual basis only upon the recommendation of the Director of Programs in Pastoral Psychology and approval of the Dean.

3. Students involved in clinical training under the direct supervision

of members of the pastoral psychology staff shall register for credit under PP 277A for 4 semester hours of credit.

4. Students involved in clinical training in other programs shall register with the ACPE and upon receipt of a supervisor's report at the end of the training period will receive 4 s.h. of transfer credit.

5. Grades for clinical training are to be reported as either *P* or *F*.

Internships

Interseminary Church and Society

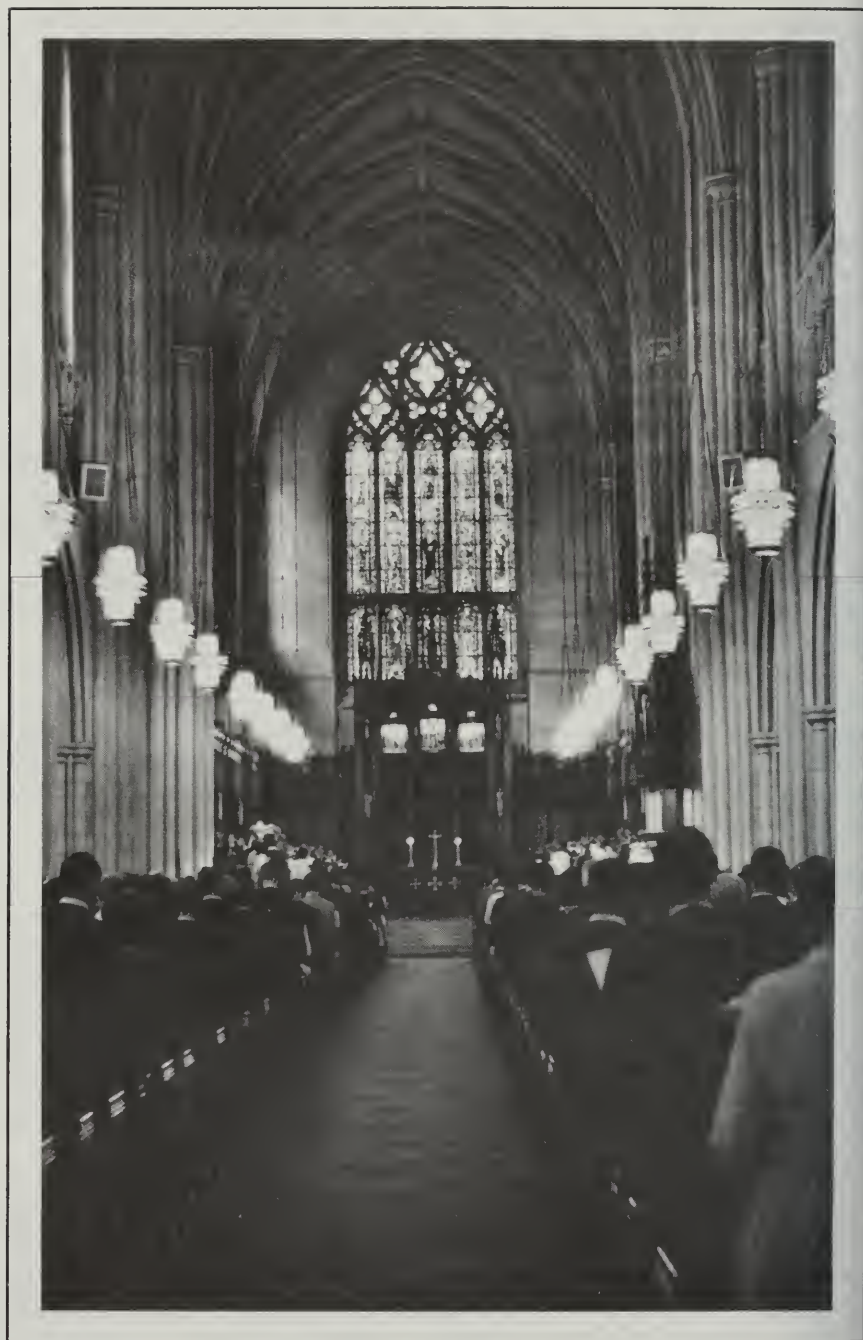
The Interseminary Church and Society Program is an experiment in the theological education of students, professors, and leaders in some of the major institutions of our time. Sponsored jointly by Duke Divinity School, Union Theological Seminary in Virginia, and Virginia Theological Seminary, the Program currently permits students to enroll for an academic year in residence at one of the participating schools and to undertake work and study in business and industry, government and politics, or science and technology. Major features of the program include specific job placement, professional and academic supervision, and regular seminars and colloquia. For further information concerning this Program, consult the Director of Field Education.

Ch.E. 131-132. *Interseminary Intern Seminar*. Development and personal projection of a style of special ministry through understanding, appreciation, involvement in and critical reflection upon environment, structures, values, and decision-making processes in: (a) business and industry; (b) science and technology; (c) government and politics. 6 s.h. *H. Smith and Others*

Other Internships

C.P. 143-144. *Campus Ministry Internship*. A nine- to twelve-month position in approved locations designed to provide professional experience, under qualified guidance, in ministering to college students. Academic seminars, a personal journal, directed readings, and evaluative reports will aid the intern in clarifying his vocational choice and professional identity as a campus minister. Open to students who have completed at least two full years of seminary and who seriously contemplate a ministry to the campus following graduation. Prerequisite: C.Ed. 149. 3 s.h. each semester. *Staff*

W.C. 197-198. *World Mission Internship*. A 12-month position under assignment by the World Division, United Methodist Board of Missions, in selected overseas locations. Designed to enrich personal and professional growth through study and involvement in the actual context of mission, the program includes directed reading, evaluation reports, and supervised field experience. 3 s.h. each semester. *Lacy*



Degrees Conferred at Commencement, 1969

Master of Divinity

James Carl Adams
Morris Lee Barber
William Donald Britt
Arthur Henry Brown, III
William Douglas Camp
William Thad Chesser
George William Climer, Jr.
John Gibson Cottingham
Benjamin Franklin Davis
Donald Douglas Davis
Linda Miner Durbin
Gerald Lloyd Edge
Glenn Dixon Fields, Jr.
Wilson Drew Heitzenrater
Jerry D. Hoskins
Elbert Johns, Jr.
Kwan-Lyun Kim
Edgar Sevier Lotspeich, III
Frederick T. Mahla
Robert Dean Meadows
Zoe Wade Murphy
David Alan Pacholke

Charles Morgan Peterson
Nancy Dale Richardson
Stanley Joe Robertson
John Edwards Rutland, Jr.
Lloyd Alfonza Sawyer
John Charles Schuster
John Arthur Siegle
William Arthur Smalling
Harold Dallas Stanley
James Carlisle Stokes, Jr.
Amos Taj
Willie Senn Teague
John Hurley Thomas, III
Sione Lepa To'a
Carson S. Tyson
Linda Vera Van Tassel
James Herbert Waller
Henry Douglas Watson
Leslie Cleveland Wicker
John W. Wilder
Peter Michael Wohlwend

Master of Theology

Charles Edward Alexander
Thomas Carroll Bourn
James Clement Buckley
Richard Lewis Cox
Jay Howard Fast
David Fox Fleece
Frank Edwin Garver
Elmer O. Hall
John Edward Crane Harris
Levi Huffman Humphreys

Conrad Randal James
Mark Kase
Hugh Franklin Lecky, Jr.
John Thomas McBride
Donald James Shoulberg, C.S.C.
Herman Edward Thomas
Charles Anthony Tansill
K. M. Varghese
Kothapalli Wilson

Master of Religious Education

Jade Lynne Dell
Ann Cameron Pearce

Carol Ann Tignor
Kothapalli Rajakumari Wilson

Enrollment 1969-70

Candidates for the Master of Divinity Degree

Adams, Larry Elliott (B.A., Millsaps College), Summit, Mississippi
Adkins, David Williams (B.A., Furman University), Pelzer, South Carolina
Adkins, Lowell Earl (A.B., Marshall University), Huntington, West Virginia
Alger, Rebecca Kay (B.A., North Carolina Wesleyan College), Durham, North Carolina
Alger, Robert Linwood (B.A., Mount Union College), Durham, North Carolina
Allred, James Grant, Jr. (A.B., Pfeiffer College), Albemarle, North Carolina
Armstrong, William Henry, Jr. (B.A., Union College), Falls Church, Virginia
Backus, Howard Gene (A.B., West Virginia Wesleyan College), Morgantown, West Virginia
Bailey, Joseph David (A.B., Wofford College), Sumter, South Carolina
Barclay, Joan Ruth (B.A., Mount Union College), North Madison, Ohio
Barnes, Bruce Lawrence (B.A., University of Virginia), Charlottesville, Virginia
Barnhardt, Roland Taylor (A.B., Duke University), Winston-Salem, North Carolina
Belton, Katherine Ann (A.B., Duke University), Houston, Texas
Bensinger, John Carl (B.A., Wesleyan University), Princeton, New Jersey
Binkley, Keith Bretch (B.A., Yale University), Oklahoma City, Oklahoma
Blackwell, Richard Thomas (B.A., University of North Carolina), Winston-Salem, North Carolina
Blankenship, Rubert J. (A.B., M.A., Bethany-Nazarene College), Bethany, Oklahoma
Bolen, William Elzie (A.B., University of North Carolina), Charlotte, North Carolina
Bond, Jeffrey Arthur (A.B., Cornell University), Caldwell, New Jersey
Bowie, William Keith (B.A., Furman University), Ware Shoals, South Carolina
Bragdon, Danyee Olin (A.B., Wofford College), Georgetown, South Carolina
Brenner, Robert Allen (A.B., Washington and Lee University), Macon, Georgia
Breyspraak, William August (B.A., Southwestern at Memphis), Memphis, Tennessee
Brogdon, John Treadway, Jr. (B.A., University of Houston), Houston, Texas
Browning, Ronald William (B.A., Hartwick College), Norwich, New York
Brunson, Jerry (B.A., Pembroke State College), Latta, South Carolina
Burgess, Stephen Webb (B.A., West Virginia Wesleyan College), Halifax, Virginia
Butler, Roger Olen (B.A., Livingstone College), Shallotte, North Carolina
Campbell, Jerry Dean (B.A., McMurry College), Kress, Texas
Carpenter, Mary Hudson (B.A., Emory and Henry College), Knoxville, Tennessee
Carter, James Joel (B.S., University of North Carolina), Candler, North Carolina
Cato, Harold Eugene (B.A., University of North Carolina), Durham, North Carolina

Channell, Kenneth Ray (B.A., Trevecca Nazarene College), Pensacola, Florida
 Churchill, Larry Raymond (B.A., Southwestern at Memphis), Little Rock, Arkansas
 Clark, James Lester (B.A., Florida State University), Hialeah, Florida
 Clifton, Larry Bruce (B.A., University of North Carolina), Charlotte, North Carolina
 Cline, Janice Dianne (B.A., University of North Carolina), Belmont, North Carolina
 Clodfelter, James Paul, Jr. (A.B., Pfeiffer College), Winston-Salem, North Carolina
 Clodfelter, William Daniel (B.A., Western Carolina University), Thomasville, North Carolina
 Coffield, Robert Fulton, Jr. (B.A., Randolph-Macon College), Windsor, Virginia
 Coile, James Henry (A.B., Atlantic Christian College), Lucama, North Carolina
 Coltharp, John Cameron (B.A., Campbell College), Wilmington, North Carolina
 Cook, Raymond Williamson (B.S., A. and T. State University), Drewry, North Carolina
 Cooper, James Charles (B.A., Lambuth College), Nashville, Tennessee
 Coulbourn, Mildred Elizabeth (B.A., Converse College; M.A., Duke University), Birmingham, Alabama
 Cox, Abram Jones, III (A.B., Duke University), Salisbury, North Carolina
 Cox, Roy David (A.B., Davidson College), Asheboro, North Carolina
 Craig, William Mark (B.A., Austin College), Fort Worth, Texas
 Crandall, Robert Steven (B.A., Simpson College), Ottumwa, Iowa
 Creech, James Edward (A.B., University of North Carolina), Chapel Hill, North Carolina
 Creech, Roy Oren, Jr. (A. B., College of William and Mary), South Boston, Virginia
 Crews, Donald Anthony (B.S., North Carolina State University), Winston-Salem, North Carolina
 Crosby, Nora Winifred (B.S., University of Alabama), Winston-Salem, North Carolina
 Cyr, Ronald Dale (B.A., North Carolina Wesleyan College), Hudson, Massachusetts
 Daly, John William Michael (B.A., MacMurray College), Chappaqua, New York
 Dell, Gregory Robert (B.A., Illinois Wesleyan University), Midlothian, Illinois
 Derreth, Richard Joseph (B.A., Central Wesleyan College), Raleigh, North Carolina
 Dial, Donald Nelson (B.A., Florida Southern College), Winterhaven, Florida
 Dodd, Robert Vess (A.B., High Point College; Candler School of Theology, 1968-1969), Charlotte, North Carolina
 Dorsey, Steven Elliott (B.S., Marshall University), Huntington, West Virginia
 Douthat, James Evans (A.B., College of William and Mary), Petersburg, Virginia
 Dowdy, Melvin (B.A., North Carolina Wesleyan College), Richmond, Virginia
 Doyal, Darris Kenton (B.S., East Tennessee State University), Knoxville, Tennessee
 Draeger, John Henry (B.A., Washington and Lee University), Arlington, Virginia
 Dukes, Hugh Lawrence, Jr. (B.A., Mercer University), Carrollton, Georgia
 Dunn, Robert Neil (B.A., Hamline University; United Theological Seminary of The Twin Cities, 1965-1966), Minnesota Lake, Minnesota
 *Early, John Firman (B.A., Rice University; M.A., University of Wisconsin), Durham, North Carolina
 Eller, James Norman (B.S., Mars Hill College), North Wilkesboro, North Carolina
 Elliott, Roger Vernon (B.A., Campbell College), Tabor City, North Carolina
 Emerson, Philip Royce (A.B., Adrian College), Auburn, Indiana
 Ennis, George Warren (B.A., North Carolina Wesleyan College; Drew University, 1967-1968), Castleton, New York
 Etherton, Rayford Lee (B.A., University of Alabama), Fort Payne, Alabama
 Ferguson, Don Ernest, Jr. (B.S., University of Tennessee), Knoxville, Tennessee
 Field, Paul Carlton (B.A., Yale University), Ormond Beach, Florida

*Interseminary Church and Society Intern.

Fife, Richard Bruce (B.A., Emory University; Candler School of Theology, 1967-1968), Jacksonville, Florida

Finnin, William Martin, Jr. (B.S., Centenary College of Louisiana), New Orleans, Louisiana

Fisher, Richard Alan (B.A., American University), Silver Spring, Maryland

Fleet, Bary Richard (A.B., University of Georgia), Athens, Georgia

Fonville, Jamie Tarpley, Jr. (B.S., Wake Forest University), Burlington, North Carolina

Forringer, Julie Mae Bethel (B.A., Mount Union College), Canal Fulton, Ohio

Fowler, Charles Joel (B.S., M.A., University of Tennessee), Clinton, Tennessee

Freeman, Howard J. (B.A., Morningside College), London, England

Fulmer, Cecil George (A.B., Newberry College), Newberry, South Carolina

Garner, Clarence (B.A., Guilford College), Milton, North Carolina

Gattis, William Hughes (B.S., University of North Carolina), Bynum, North Carolina

Geers, Clifford A. (B.A., Morehead State University), Cincinnati, Ohio

Gerhardt, William Frederic (A.B., Davidson College), Thomasville, North Carolina

Giddens, Charles Franklin, Jr. (B.A., Huntingdon College), Marianna, Florida

Gilbert, Milton Heath (B.A., Adrian College), Ludington, Michigan

Godwin, James Badger, Sr. (B.A., University of Virginia), Sanford, Virginia

Goldfinch, Albert Eugene, Jr. (B.A., Wheaton College), Raleigh, North Carolina

Gray, Stephen Collinson (B.A., Middlebury College), Holden, Massachusetts

Grayson, James Huntley (B.A., Rutgers University; M.A., Columbia University), Madison, New Jersey

Greenawalt, Robert Lester (B.S., Virginia Polytechnic Institute), Hopewell, Virginia

*Grigsby, Robert Lee (A.B., Birmingham-Southern College), Birmingham, Alabama

Halbrook, John Harvey (B.A., Carson-Newman College), Lake City, Florida

Hall, Andrew Martie, Jr. (A.B., Hendrix College), North Little Rock, Arkansas

Hall, Ronald Lavon (A.B., Stetson University), Durham, North Carolina

Hall, William Morris (B.A., Campbell College; Southern Baptist Theological Seminary), Raleigh, North Carolina

Hanson, Alan Jay (B.A., Adrian College), Carrollton, Michigan

Harbour, Alvin Norris, Jr. (B.A., University of South Alabama), Mobile, Alabama

Harris, Howard Stanley (A.B., College of William and Mary; University of North Carolina, 1968-1969), Richmond, Virginia

Heathcock, J. Edwin (B.S., Central Michigan University), Ithaca, Michigan

Hendricks, John Richard (B.M.E., Mount Union College), Scio, Ohio

Herndon, Bayard Preston (B.S., Ohio University), Findlay, Ohio

Hicks, Steven Lynn (A.B., High Point College), Greensboro, North Carolina

Hill, William Bailey (B.A., Western Maryland College), Dayton, Maryland

Hoffman, William Larsen (B.A., University of Texas), Fort Worth, Texas

Holtscaw, Thomas (A.B., Morris Harvey College), Charleston, West Virginia

Hooper, Fredric Michael (B.A., Wake Forest University), Reidsville, North Carolina

*Horner, John Scott (B.S., Virginia Military Institute), Richmond, Virginia

Howe, Jeffrey Gordon (B.A., Amherst College), Moscow, Idaho

Hudgins, Morris Wayne (B.A., Central Methodist College), St. Louis, Missouri

Hudson, Blaine Steven (A.B., University of North Carolina), Hendersonville, North Carolina

Humphries, Charles Rayford (A.B., Wofford College), Union, South Carolina

Hutcherson, Ernest Keith (B.A., Wake Forest University), Winston-Salem, North Carolina

*Inderfurth, Karl (A.B., University of North Carolina), Charlotte, North Carolina

Jarvis, James Mason (B.A., Ohio Wesleyan College), Parkersburg, West Virginia

*Interseminary Church and Society Intern.

Jessee, Durward Douglas (B.A., Berea College), Tazewell, Virginia
 Johnson, Claud Roland (B.A., Furman University), Greenville, South Carolina
 Jones, Farris Jay Weigel (A.B., Duke University), Jacksonville, Florida
 Jones, Preston C. (B.S., Livingstone College; North Carolina Central University),
 Red Springs, North Carolina
 Jordan, David Michael (A.B., Duke University), Lake Junaluska, North Carolina
 Jordan, Nerius Fred, Jr. (A.B., Catawba College), Salisbury, North Carolina
 Joyce, Thomas Lee (B.A., Emory and Henry College), Ridgeway, Virginia
 Judy, Karl Wesley (A.B., Pfeiffer College), Raleigh, North Carolina
 Junk, Daryl Robert (B.A., Illinois Wesleyan University), Bloomington, Illinois
 *Kallmyer, Jack Robinson (B.A., Wheaton College), Tallmadge, Ohio
 Kammer, Charles Louis, III (B.A., Colgate University), Glenshaw, Pennsylvania
 Kelly, David Gerald (B.S., University of Tennessee), Chattanooga, Tennessee
 Kerr, Robert Lowell (A.B., Florida Southern College), Miami, Florida
 Keyworth, Richard (A.B., Brown University), Gardner, Massachusetts
 Kieser, Jane Ellen (B.S., University of Wisconsin), Prairie du Chien, Wisconsin
 Kimel, Larry Leslie (A.B., University of North Carolina), Winston-Salem, North
 Carolina
 Knight, Cecil Horger (B.S., University of South Carolina; D.D.S., Medical College
 of Virginia), Columbia, South Carolina
 Kroll, Richard Arthur (B.A., Tusculum College), Washington, D. C.
 Larsen, John Anderson (A.B., Bethel College; University of Aberdeen-Faculty of
 Divinity 1966-67; Bethel Theological Seminary 1967-68), St. Paul, Minnesota
 Lawrence, Happy James (B.A., Pfeiffer College), New Smyrna Beach, Florida
 Leatherwood, James Michael (B.S., North Carolina State University), Clyde, North
 Carolina
 Lee, Billy Franklin (B.S., Pembroke State College), Hamlet, North Carolina
 Lee, Dennis Ray (A.B., Wofford College), West Columbia, South Carolina
 Leeds, Robert Shannon (B.A., Pennsylvania State University), Harrisburg, Pennsyl-
 vania
 Lenox, Roy Everette, Jr. (B.A., Grinnell College), Levittown, New York
 Lewis, Elroy (B.S., A. and T. State University), Greensboro, North Carolina
 Lewis, Thomas DeWitt (B.A., Pfeiffer College), Asheboro, North Carolina
 Louden, William Frank (B.A., Mount Union College), New Castle, Pennsylvania
 Lovelace, Henry Neal (B.A., Hendrix College), Townsville, North Carolina
 Loyd, Martha Ellen (B.S., Fairmont State College), Sutton, West Virginia
 Lucas, Arthur Monroe (B.A., University of Virginia), Fairfax, Virginia
 McArthur, William Kenneth (A.B., University of North Carolina), Greenville, North
 Carolina
 †McCleery, Richard Frederick (B.A., American University), East Aurora, New York
 McClelland, Lloyd Clyde (A.B., Florida Southern College), Snow Camp, North
 Carolina
 McClung, James Andrew (B.A., Emory and Henry College), Norfolk, Virginia
 McColgan, Edgar Bornman (B.A., Southwestern at Memphis), Pine Bluff, Arkansas
 McConathy, Robert Marshall, III (B.A., Southwestern University), Beaumont, Texas
 McCullough, James d'Alvigny (A.B., Duke University), Honea, South Carolina
 McDawd, Robert Neil (B.A., Huntington College), Mobile, Alabama
 McKeown, Robert Eugene (B.S., Furman University), Chester, South Carolina
 McLeod, Lionel Powers, Jr. (B.A., Emory University), Montgomery, Alabama
 McMillan, John Samuel (A.B., University of North Carolina), Coats, North Carolina
 McMullen, John Henry, Jr. (B.A., Southwestern University), Weslaco, Texas

*Interseminary Church and Society Intern.

†World Missionary Intern.

McMurry, Joseph Crowell (B.A., Appalachian State University), Belwood, North Carolina

Mann, John Martin (B.A., Clarion State College), Irwin, Pennsylvania

Markham, Talmadge Thomas (B.A., Lynchburg College), Boydton, Virginia

Martin, Richard Merle (B.A., Birmingham-Southern College), Calera, Alabama

Martin, Russell Earl (A.B., Baldwin-Wallace College), East Cleveland, Ohio

Medlin, William Tracy, III (A.B., Pfeiffer College), Albemarle, North Carolina

Meriwether, David Peck (B.A., Baylor University), San Antonio, Texas

Miller, Harold Dan (B.A., Wake Forest University), Winston-Salem, North Carolina

Miller, John Dale (A.B., Grove City College), Seneca, Pennsylvania

Miller, John Teague (A.B., Wofford College), Greenwood, South Carolina

Mitchem, Kathryn Lucile (B.S., University of Northern Iowa), Marshalltown, Iowa

Moore, Jerry Wayne (B.A., Elon College), Burlington, North Carolina

Morris, Jerry McArthur (B.A., Huntingdon College), Pensacola, Florida

Mosher, Charles John (B.A., Mount Union College), Louisville, Ohio

Mullen, William Doverspike (B.A., University of North Carolina), Tampa, Florida

Munson, Karl Leonard (B.A., Hiram College), Maywood, Illinois

Netting, Karl Arthur (B.A., Emory and Henry College), Arlington, Virginia

Newman, Harvey Knupp (A.B., Davidson College), Chapel Hill, North Carolina

Nolan, Thomas James (A.B., LeMoyne College; M.A., Colgate University), Waverly, New York

Noseworthy, James Arthur (B.A., Simpson College), Reading, Massachusetts

Omansiek, William Walter (B.A., University of Michigan), Mt. Clemens, Michigan

Osborne, Barry Phillip (A.B., High Point College), Asheboro, North Carolina

Owen, Paul Scott, Jr. (A.B., High Point College), High Point, North Carolina

Peel, John Jay, Jr. (B.S., North Texas State University), Denton, Texas

Pettyjohn, Walker (B.A., Lynchburg College), Lynchburg, Virginia

Poag, Lewis Lowe (B.A., Florida State University), Tallahassee, Florida

Polderman, Ronald Lee (B.A., College of Wooster), Hewitt, New Jersey

Pollard, William F. (B.A., Centre College; Duke University 1968-69), North Pleasureville, Kentucky

Potts, Michael Dan (B.A., Oklahoma City University), Woodward, Oklahoma

Powell, James Lee (A.B., Duke University), Kernersville, North Carolina

Reeves, James Robert (B.A., Scarritt College), Clyde, North Carolina

Reuthinger, Gary Michael (B.A., State University of New York), Somerville, New Jersey

Rhode, Robert Huff (B.A., Hardin-Simmons University; Southern Baptist Theological Seminary), Silvertown, Texas

Rice, Joe Crosby (B.A., Centenary College of Louisiana), Shreveport, Louisiana

Richards, Richard Porter (B.A., Hiram College), Pittsburgh, Pennsylvania

Rintamaa, Richard Alan (B.A., Hiram College), Cincinnati, Ohio

Roberts, Laurie Charles (B.A., Colgate University), Camp Hill, Pennsylvania

Ruth, John William (B.A., Mars Hill College), New Castle, Delaware

Rutledge, David (A.B., College of William and Mary), Newport News, Virginia

Sachs, Alvin Dwain (B.S. in Ed., Southwest Missouri State College), St. Louis, Missouri

Sagar, Harry Andrew, III (B.A., The American University), Mansfield, Pennsylvania

Sands, Blase Dale (A.B., Duke University), Arlington, Virginia

Sandusky, Paul Allen (B.A., Denison University), Pittsburgh, Pennsylvania

Sapp, James Stephen (A.B., Duke University; Union Theological Seminary of New York), Asheville, North Carolina

Scrimsher, Sheryl Lou (B.A., Nebraska Wesleyan University), Grafton, Nebraska

Segin, James Edward (B.S., Nebraska Wesleyan University), Brookfield, Illinois

Settle, Charles Thomas (B.S., Arkansas A. and M. College), Little Rock, Arkansas

Seymour, Joseph Cyril (B.A., Greensboro College), Salisbury, North Carolina
 Sheridan, Rutledge Dantzler, Jr. (A.B., Wofford College), Spartanburg, South Carolina
 Shumake, James F. (A.B., Virginia Union University; Howard University), Detroit, Michigan
 Shuttlesworth, Gerald L. (A.B., West Virginia University), Morgantown, West Virginia
 Sills, Mark Robinson (A.B., Greensboro College; Wesley Theological Seminary 1967-68), Greensboro, North Carolina
 Smith, Robert Cowan (B.S., University of Tennessee), Knoxville, Tennessee
 Smith, Roger Lee (A.B., West Virginia Wesleyan College), Charleston, West Virginia
 Steele, David Lee (A.B., Duke University), Salisbury, North Carolina
 Stolz, Wolfgang Franz (B.A., Lee College), St. Ingbert, Germany
 Tanner, William Douglas, Jr. (A.B., Duke University), Rutherfordton, North Carolina
 Taylor, Bruce Davis (A.B., Trinity College), Lumberton, North Carolina
 Taylor, William Winston (B.A., North Carolina Wesleyan College), Stonewall, North Carolina
 Trollinger, James Thomas (A.B., Guilford College), Asheboro, North Carolina
 Tufts, Rutledge, Jr. (B.A., Southwestern at Memphis), Atlanta, Georgia
 Umberger, Fred Lee (A.B., Roanoke College; Lutheran Southern Seminary 1968-69), Roanoke, Virginia
 Vagt, Robert Frederick (A.B., Davidson College), Naugatuck, Connecticut
 Vaughan, Charles Ray (B.A., Old Dominion College), Norfolk, Virginia
 Vaughan, Thomas Ronald (B.A., Harding College), Durham, North Carolina
 Virant, Gary Ronald (B.A., Hiram College), North Royalton, Ohio
 Walker, Alan John (B.A., Lee College), Durham, North Carolina
 Walker, John William (A.B., Allegheny College; Friedrich-Alexander University 1968-69), Butler, Pennsylvania
 Walker, Richard Keith, II (B.A., Florida State University), Orlando, Florida
 Wallace, Harold Gene (B.A., Claflin College), Gaffney, South Carolina
 Wallace, John Wesley (B.A., Morningside College), Boise, Idaho
 Ward, Dann Ray (B.A., Huntingdon College), Brewton, Alabama
 Watkins, LeRoy (B.A., McMurry College), Jal, New Mexico
 Watson, Thomas Richard (A.B., Duke University), Raleigh, North Carolina
 Watts, Steven Miles (B.A., Appalachian State University), Durham, North Carolina
 Waugh, Randolph Phillip (A.B., High Point College), Asheville, North Carolina
 Welch, Patrick Paul (B.A., Bethel College), Humboldt, Iowa
 Wells, Woodrow Wilson (A.B., Methodist College), Fayetteville, North Carolina
 Westbrook, Hugh Ashley (A.B., Emory University), Jacksonville, Florida
 White, John Bradley (B.A., Emory and Henry College), Pulaski, Virginia
 Wiggins, Carson Olin (B.A., Lee College), Gastonia, North Carolina
 Williams, Charles Patrick (B.S., University of South Carolina), Branchville, South Carolina
 Williams, John Eldred (B.A., North Carolina Wesleyan College), Rocky Mount, North Carolina
 Williams, Richard Keith (B.S., Adrian College), Fremont, Michigan
 Wilson, Benjamin Franklin (B.A., Appalachian State University), Grayson, North Carolina
 Wilson, Earl, Jr. (A.B., Shaw University), Raleigh, North Carolina
 Wilson, John Christian (A.B., Duke University), Winston-Salem, North Carolina
 Wilson, Martha Wray Montague (A.B., Duke University), Jacksonville, Florida
 Wilson, Victor Otis, Jr. (B.A., Furman University), Sumter, South Carolina
 Wimberly, Lorris May, Jr. (A.B., Centenary College of Louisiana), Arcadia, Louisiana

Winkleblack, Dennis R. (A.B., William Jewell College; Midwestern Baptist Seminary), Kansas City, Missouri
 Wiygul, James Hershel (B.A., Mississippi State University), Nettleton, Mississippi
 Wolfe, Charles William (A.B., Atlantic Christian College), Asheville, North Carolina
 Woodruff, Charles Edwin, Jr. (A.B., High Point College), Roanoke Rapids, North Carolina
 Worthy, Carl McGhee, Jr. (A.B., High Point College), Charlotte, North Carolina
 Wray, Harmon Lee, Jr. (B.A., Southwestern at Memphis), Memphis, Tennessee
 Yacoubian, George (B.A., American University at Beirut), Old City, Jerusalem, Jordan
 Young, John Kenneth (A.B., Lincoln Memorial University), Coeburn, Virginia
 Yow, Thomas Sidney III (B.A., Methodist College), Garner, North Carolina
 Zarecki, John Paul (B.A., Colgate University), Neville, Pennsylvania

Candidates for the Master of Theology Degree

Blackwelder, David Lewis (B.A., Roanoke College; B.D., Lutheran Theological Seminary), Washington, D. C.
 Delaney, Gordon Arthur (B.A., Gordon College; B.D., Acadia University), Moncton, New Brunswick, Canada
 Frazier, Joseph Robert (A.B., William Jewell College; B.D., Midwestern Baptist Seminary), Pensacola, Florida
 Fritz, Edmund William (B.A., Lincoln University; B.D., Concordia Theological Seminary), Greensboro, North Carolina
 Jaquette, John Paul (B.A., Ohio Wesleyan University; M.Div., Duke University), Newark, Delaware
 Lutz, Fritz (University of Basle; University of Zurich), Speicher, Switzerland
 Mott, John Chilton (B.A., University of Virginia; B.D., Virginia Episcopal Theological Seminary), Chapel Hill, North Carolina
 Olney, William (B.A., Randolph-Macon College, B.D., Union Theological Seminary), Hillsborough, North Carolina
 Pacholke, David Alan (B.A., Morningside College; M.Div., Duke University), Council Bluffs, Iowa
 Peterson, Charles Morgan (B.A., West Virginia Wesleyan College; M.Div., Duke University), Weston, Virginia
 Reidy, Edward Joseph (A.B., Loyola University; 1958-62, St. Procopius Seminary), Chicago, Illinois
 Sample, James Preston, III (A.B., Duke University; B.D., Union Theological Seminary of Virginia), Charlotte, North Carolina
 Stillwell, Robert Earl (B.A., Furman University; Oriel College, University of Oxford), North Augusta, South Carolina
 Van Tassel, Linda Vera (A.B., Drew University; M.Div., Duke University), Saugerties, New York
 Walaskay, Maxine Catherine Feliks (B.D.Ed., Wayne State University; B.D., Colgate-Rochester Divinity School), Dearborn, Michigan
 Wallace, Robert Louis (B.A., University of Southern Mississippi; B.D., Duke University), Orwell, Ohio
 Winegar, Grady Clarence (B.A., Emory and Henry College; B.D., Duke University), Gate City, Virginia

Candidates for the Master of Religious Education Degree

Bergeron, Albert Lucien (B.A., Abilene Christian College), Raleigh, North Carolina
 Carpenter, Ina Leemo Mason (B.S., University of Kentucky), Durham, North Carolina

Davis, Donna (B.A., Methodist College), Raleigh, North Carolina
 DeWolfe, Barbara Anne (B.A., Stetson University), Boca Raton, Florida
 Foglesong, Elizabeth Ellen (A.B., West Virginia Wesleyan College), Mullens, West Virginia
 Foster, Gloria Jean (A.B., LaGrange College), Columbus, Georgia
 Na, Won Yong (Seoul Methodist Theological Seminary 1952-56; B.A., Wonju College), Wonju, Korea
 Peng, William Chuan-Ching (B.A., Chung Chi College; B.Th., Bethel Bible Seminary), Kowloon, Hong Kong
 Thomas, Suzanne Gayle (B.A., Morris Harvey College), Charleston, West Virginia
 Walker, Dorothy Ellen Sibley (B.A., Millsaps College), Gulfport, Mississippi
 White, Rebecca Clark (B.S., Longwood College), Richmond, Virginia
 Yun, Myung Ok (B.Th., Seoul Methodist Theological Seminary), Seoul, Korea

Special Students

Dodson, Samuel Gordon, Jr. (B.A., Elon College; M.Ed., Virginia Polytechnic Institute), Efland, North Carolina
 Hadley, Martha Jane (A.B., High Point College), Asheboro, North Carolina
 Herndon, Joyce Davis (B.A., William Jewel College; Southeastern Baptist Theological Seminary), Independence, Missouri
 Jacobs, Marvin Earl (B.A., Roanoke College; B.D., Southern Baptist Theological Seminary), Danville, Virginia
 Kimrey, Timothy Hooper (B.A., Davidson College; Union Theological Seminary of New York 1965-69), Durham, North Carolina
 Libby, Gary Wayne (B.A., University of Maine), Portland, Maine
 McClernon, Robert E. (A.B., Drury College; B.D., University of Chicago), Durham, North Carolina
 Morrison, Paul Charles (A.B., Case-Western Reserve University; B.D., Bexley Hall Seminary), Durham, North Carolina
 Smith, Cheryl Anne (B.A., University of Alberta; Andover Newton Theological School), Chapel Hill, North Carolina
 Thomas, George Alexander (A. B., University of North Carolina; B.D., Princeton Theological Seminary; Th.M., Princeton Theological Seminary), Raleigh, North Carolina
 Tollerson, James William (B.A., Harding College; M.A., Harding Graduate School), Greensboro, North Carolina
 Varghese, Kochuplavillail Mathai (B.D., Serampore College, India; S.T.M., Union Theological Seminary of New York; Th.M.; Duke University), Alaramapuram, Kerala, India
 Waller, John Gary (A.B., Huntingdon College; B.D., Columbia Theological Seminary; Th.M., Duke University), Montgomery, Alabama
 Wheelchel, Love H. (A.B., Paine College; S.T.M., Boston University; M.S. New York University), Macon, Georgia
 Woods, William Joseph (A.B., Holy Cross College; Portsmouth Priory), Durham, North Carolina

Enrollment Graduate Division of Religion 1969-70

- Ames, John T. (B.A., University of Mississippi; B.D. Union Theological Seminary, Richmond), Rockville, Maryland
- Armour, Clifford A., Jr. (B.A., Duke University; S.T.B., Wesley Theological Seminary, North East, Maryland)
- Aull, James S. (A.B., Newberry College; B.D., Lutheran Southern Seminary), Columbia, South Carolina
- Belk, Bonnie F. (B.A., Campbell College), Indian Trail, North Carolina
- Bostian, E. Jane (B.A., Salem College), Granite Quarry, North Carolina
- Boulton, Wayne G. (B.A., Lafayette College; B.D., McCormick Seminary), Avon, Connecticut
- Brannan, Emora T. (B.A., Johns Hopkins University; B.D., Drew University), Baltimore, Maryland
- Butler, Gerald A. (B.A., Hampden-Sydney College; B.D., Union Theological Seminary in Virginia), Washington, D. C.
- Byrne, Donald E., Jr. (B.A., St. Paul Seminary; M.A., Marquette University), Forest Lake, Minnesota
- Chang, Kuk Won (B.A., College of Liberal Arts & Sciences, Seoul National University; M.A., Graduate School, Seoul University), Seoul, Korea
- Chase, Carole F. (B.A., College of William & Mary; M.A., Presbyterian School of Christian Ed.), Richmond, Virginia
- Coleman, Theodore, Jr. (B.A., Duke University; M.Div., Southeastern Seminary), Durham, North Carolina
- Dowda, Robert E. (B.A., Birmingham-Southern College; B.D., Th.M., Duke Divinity School), Mebane, North Carolina
- Dueck, Abram J. (Th.B., Mennonite Brethren Bible College; B.A., University of British Columbia, Canada; B.D., Goshen College Biblical Seminary), Ontario, Canada
- Durway, Daniel L. (B.A., University of Texas; B.D., Austin Presbyterian Theological Seminary), Charlotte, North Carolina
- Fahning, John E. (B.B.A., University of Minnesota; B.D., Luther Theological Seminary; S.T.M., Yale Divinity School), Durham, North Carolina
- Fairbairn, J. Ronald (B.A., Baylor University; B.D., Southern Baptist Theological Seminary), Louisville, Kentucky
- Frederick, Stephen C. (B.A., Hamilton College; B.D., Princeton Theological Seminary), Port Jarvis, New York
- Gentle, Brian G. (B.A., Wheaton College; B.D., Yale Divinity School; M.A., Columbia University), Norfolk, Virginia

Greenlaw, William A. (B.A., University of California at Riverside; B.D. Union Theological Seminary, NYC), La Crescenta, California

Hanigan, James P. (B.A., M.A., Fordham University; B.D., Woodstock College, Maryland), Bronx, New York

Harris, J. Colin (A.B., Mercer University; M.Div., Southeastern Baptist Theological Seminary), Decatur, Georgia

Hayes, William M. (B.A., St. Mary's, Tallaght, Dublin, Ireland; M.A. & S.T.L., Aquinas Institute, Iowa), Cork, Ireland

Horton, Fred L., Jr. (B.A., University of North Carolina; B.D., Union Theological Seminary, NYC), Roanoke, Virginia

Hoyt, Thomas, Jr. (B.A., Lane College; B.D., Interdenominational Theological Center, Georgia; S.T.M., Union Theological Seminary, NYC), Evansville, Indiana

Johnson, Paul R. (B.A., Bethel College; M.Div., Bethel Theological Seminary), Minneapolis, Minnesota

Keeney, Jerry D. (A.A., Southwest Baptist College; B.A., Union University; Th.M., New Orleans Baptist Theological Seminary), Bourbon, Missouri

Kirkham, Donald H. (B.A., University of Sydney; M.Ed., University of Sydney; B.D., Drew University), Nowra, N.S.W., Australia

Kline, Lawrence O. (B.A., Drew University; B.D., Drew University; M.L.S., Rutgers University; M.A., New York University), Waverly, New York

Koo, Tuck Kwan (Th.B., Methodist Theological Seminary, Korea; B.D., Methodist Theological School in Ohio), Seoul, Korea

Little, James C. (Diploma of Church of Scotland, Trinity College, Glasgow; B.D., Duke Divinity School), Glasgow, Scotland

Mackie, M. Beth (B.A., Agnes Scott College), Gastonia, North Carolina

Malone, Michael T. (B.A., Duke University; B.D., Virginia Theological Seminary), Edenton, North Carolina

Pharr, Philip A. (A.B., Pfeiffer College; B.D., Th.M., Duke Divinity School), Statesville, North Carolina

Pratt, Lindsay P., Jr. (B.A., Wake Forest College; M.Div., Crozer Theological Seminary), Goldsboro, North Carolina

Price, Robert E. (B.A., Columbia College; B.D., Union Theological Seminary, NYC), Little Rock, Arkansas

Quinn, Wylie S. (B.A., Davidson College; B.D., S.T.M., Yale Divinity School), Gastonia, North Carolina

Ritchie, B. Maurice (B.A., Davidson College; B.D., Th.M., Duke Divinity School), Concord, North Carolina

Seymour, Betty Jean (B.A., Furman University; M.A., University of Richmond; M.R.E., Southern Baptist Theological Seminary), Richmond, Virginia

Shoemaker, Steven R. (B.A., Wheaton College; B.D., S.T.M., McCormick Seminary), Urbana, Illinois

Simpson, William C. (B.A., Huntingdon College; B.D., Emory University), Cantonment, Florida

Taylor, Lewis J., Jr. (B.S., U.S. Naval Academy; B.D., Seabury-Western Theological Seminary), Virginia Beach, Virginia

Viviano, Benedict T. (B.A., M.A., Aquinas Institute), Dubuque, Iowa

Walaskay, Paul W. (B.A., Wayne State University; B.D., Colgate-Rochester Divinity School), Dearborn, Michigan

Wallace, Charles I., Jr. (B.A., Bowdoin College; B.D., Yale Divinity School), Annapolis, Maryland

Wappler, Edwin G. (B.A., Northwestern University; B.D., S.T.M., Seabury-Western Theological Seminary), Des Plaines, Illinois

Weeks, Louis B. (B.A., Princeton University; B.D., Union Theological Seminary in Virginia), Richmond, Virginia

White, C. Denny, Jr. (B.A., Duke University; M.Div., Duke Divinity School),
Gastonia, North Carolina
Wilson, John W. (N.S.W., Australia, Teachers Certificate; B.D., University of
London; S.T.M., Yale Divinity School), Harbord, N.S.W., Australia

Enrollment Summary

Divinity School Students (261 M.Div., 17 Th.M., 12 M.R.E., 15 Special), academic year 1969-70; Graduate Program of Religion Students, academic year 1969-70, 49; Total 354.

(The statistics below do not include students of the Graduate Division of Religion.)

Institutions Represented

Abilene Christian College	1	Catawba College	1
Acadia University	1	Centenary College of Louisiana	3
Adrian College	4	Central Michigan University	1
Agricultural and Technical State University of North Carolina	2	Central Methodist College	1
Allegheny College	1	Central Wesleyan College	1
American University	3	Centre College	1
American University of Beirut	1	Chaffin College	1
Amherst College	1	Chung Chi College	1
Andover-Newton Theological School ..	1	Clarion State College	1
Appalachian State University	3	Colgate University	4
Arkansas Agricultural and Mechanical College	1	Colgate-Rochester Divinity School ..	1
Atlantic Christian College	2	College of William and Mary	4
Austin College	1	College of Wooster	1
Baldwin-Wallace College	1	Columbia Theological Seminary	1
Baylor University	1	Columbia University	1
Berea College	1	Concordia Theological Seminary	1
Bethany Nazarene College	1	Converse College	1
Bethel Bible Seminary	1	Cornell University	1
Bethel College	2	Davidson College	5
Bethel Theological Seminary	1	Denison University	1
Bexley Hall Seminary	1	Drew University	2
Birmingham-Southern College	2	Drury College	1
Boston University	1	Duke University	25
Brown University	1	East Tennessee State University	1
Campbell College	3	Elon College	2
Carson-Newman College	1	Emory and Henry College	6
Case-Western Reserve University	1	Emory University	5
		Fairmont State College	1
		Florida Southern College	3

Florida State University	3	North Texas State University	1
Frederich-Alexander University (West Germany)	1	Ohio University	1
Furman University	6	Ohio Wesleyan College	2
Gordon College	1	Oklahoma City University	1
Greensboro College	2	Old Dominion College	1
Grinnell College	1	Oxford University	1
Grove City College	1	Paine College	1
Guilford College	2	Pembroke State College	2
Hamline University	1	Pennsylvania State University	1
Hardin-Simmons University	1	Pfeiffer College	6
Harding College	2	Princeton Theological Seminary	1
Hartwick College	1	Randolph-Macon College	2
Hendrix College	2	Rice University	1
High Point College	8	Roanoke College	3
Hiram College	4	Rutgers University	1
Howard University	1	Scarritt College	1
Huntingdon College	5	Serampore University	1
Illinois Wesleyan University	2	Shaw University	1
LaGrange College	1	Simpson College	2
Lambuth College	1	Southeastern Baptist Theological Seminary	1
Lee College	3	Southern Baptist Theological Seminary	3
Le Moyne College	1	Southwest Missouri State College ...	1
Lincoln Memorial University	1	Southwestern at Memphis	5
Lincoln University	1	Southwestern University	2
Livingstone College	2	State University of New York	1
Longwood College	1	St. Procopius Seminary	1
Loyola University	1	Stetson University	2
Lutheran Southern Seminary	1	Trevecca Nazarene College	1
Lutheran Theological Seminary	1	Trinity College	1
Lynchburg College	2	Tusculum College	1
MacMurry College	1	Union College	1
Marshall University	2	Union Theological Seminary (New York)	4
Mars Hill College	2	Union Theological Seminary of Virginia	1
McMurry College	2	United Theological Seminaries of the Twin Cities	1
Medical College of Virginia	1	University of Aberdeen	1
Mercer University	1	University of Alabama	2
Methodist College	3	University of Alberta	1
Methodist Theological Seminary (Korea)	2	University of Basle	1
Middlebury College	1	University of Chicago	1
Midwestern Baptist Seminary	2	University of Georgia	1
Millsaps College	2	University of Houston	1
Mississippi State College	1	University of Kentucky	1
Morehead State University	1	University of Maine	1
Morningside College	3	University of North Carolina	16
Morris Harvey College	2	University of Northern Iowa	1
Mount Union College	6	University of South Alabama	1
Nebraska Wesleyan University	2	University of South Carolina	2
Newberry College	1	University of Southern Mississippi ...	1
New York University	1	University of Tennessee	4
North Carolina Central University ..	1		
North Carolina State University	2		
North Carolina Wesleyan College ...	6		

University of Texas	1	Wesley Theological Seminary	1
University of Virginia	5	Wesleyan University	1
University of Wisconsin	2	West Virginia University	1
University of Zurich	1	West Virginia Wesleyan College	5
Virginia Episcopal Theological Seminary	1	Western Carolina University	1
Virginia Military Institute	1	Western Maryland College	1
Virginia Polytechnic Institute	2	Wheaton College	2
Virginia Union University	1	William Jewel College	3
Wake Forest University	4	Wofford College	6
Washington and Lee University	2	Wonju College	1
Wayne State University	1	Yale University	2

*Denominations Represented—1969-70

United Methodist	213	Nazarene	2
Baptist	17	Presbyterian, U. S.	2
Presbyterian	15	Reformed Church of America	2
United Church of Christ	9	Assembly of God	1
Episcopal	6	First Christian	1
Lutheran	6	Swiss Reformed Church	1
Southern Baptist	4	Syrian Orthodox	1
Church of God	3	Unitarian	1
Disciples of Christ	3	United Baptist	1
Moravian	3	United Holy	1
Roman Catholic	3	United Presbyterian, U. S. A.	1
African Methodist Episcopal Zion ..	2	No Denomination listed	5
Church of Christ	2	Total.....	305

*Divinity School Only.

*Geographical Distribution—1969-70

North Carolina	100	Arkansas	4
Virginia	29	Iowa	4
South Carolina	18	Massachusetts	4
Florida	17	Missouri	4
Ohio	11	Louisiana	3
Pennsylvania	11	Mississippi	3
Texas	10	Oklahoma	3
West Virginia	10	Delaware	2
Alabama	9	Idaho	2
Tennessee	9	Korea	2
Michigan	7	Maryland	2
New York	7	Minnesota	2
Georgia	6	Washington, D. C.	2
Illinois	5	Canada	1
New Jersey	5	China	1

*Divinity School Only.

Connecticut	1	Maine	1
England	1	Nebraska	1
Germany	1	New Mexico	1
India	1	Switzerland	1
Indiana	1	Wisconsin	1
Jordan	1		
Kentucky	1	Total	305







1970

JULY

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SEPTEMBER

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NOVEMBER

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1971

JANUARY

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MAY

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SEPTEMBER

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FEBRUARY

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JUNE

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BULLETIN OF DUKE UNIVERSITY

Information and Regulations
Undergraduate Colleges and Schools
1970



Annual Bulletins

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BULLETIN OF DUKE UNIVERSITY

Information and Regulations
1970-1971

Undergraduate Colleges and Schools

Trinity College
The Woman's College
The School of Engineering
The School of Nursing

Durham, North Carolina 1970

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University Calendar 1970-1971

1970

September

- 14 Monday—Senior clinical nursing courses scheduled
- 15 Tuesday, 7:30 p.m.—Orientation begins: assemblies for all new students entering Trinity College, The Woman's College, the School of Engineering, and the School of Nursing
- 17 Thursday—Registration and matriculation of freshmen students of Trinity College, The Woman's College, the School of Engineering, and the School of Nursing
- 18 Friday—Registration and matriculation of all new and non-pre-registered students in the Graduate School; Trinity College, The Woman's College, School of Engineering, and the School of Nursing transfer and returning students who have not pre-registered
- 19 Saturday—Final registration of preregistered students
- 21 Monday, 9:00 a.m.—Fall semester classes begin

October

- 17-18 Inauguration weekend

November

- 16 Monday—Last day for reporting six-weeks grades
- 16-19 Preregistration for spring semester, 1971
- 25 Wednesday, 12:10 p.m.—Thanksgiving recess begins
- 30 Monday, 9:00 a.m.—Classes are resumed

December

- 11 Friday—Founders' Day
- 18 Friday, 6:00 p.m.—Christmas recess begins

1971

January

- 4 Monday, 9:00 a.m.—Classes are resumed
- 15 Friday, 6:00 p.m.—Fall semester classes end

- 16-19 Saturday-Tuesday—Fall semester reading period
20 Wednesday—Final exams begin
29 Friday—Final exams end

February

- 4 Thursday—Registration and matriculation of new students
6 Saturday—Last day for matriculation for spring semester
8 Monday, 9:00 a.m.—Spring semester classes begin

March

- 24 Wednesday—Last day for reporting mid-term grades
26 Friday, 6:00 a.m.—Spring recess begins

April

- 5 Monday, 9:00 a.m.—Classes are resumed
12-15 Preregistration for Summer Session and fall semester, 1971

May

- 20 Thursday, 6:00 p.m.—Spring semester classes end
21-22 Friday, Saturday—Reading period
24 Monday—Final exams begin

June

- 2 Wednesday—Final exams end
5 Saturday—Commencement begins
6 Sunday—Commencement Sermon
7 Monday—Graduation exercises

Officers of the University

General Administration

Terry Sanford, J.D., LL.D., L.H.D., D.P.A., *President*

A. Kenneth Pye, LL.M., *Chancellor*

John O. Blackburn, Ph.D., *Provost*

Charles B. Huestis, *Vice President for Business and Finance*

William G. Anlyan, M.D., *Vice President for Health Affairs*

Frank Leon Ashmore, A.B., *Vice President for Institutional Advancement*

Gerhard Chester Henriksen, M.A., C.P.A., *Vice President and Treasurer*

Everett Harold Hopkins, M.A., LL.D., *Vice President for Regional Programs*

Harold Lewis, Ph.D., *Vice Provost and Dean of Faculty*

John C. McKinney, Ph.D., *Vice Provost and Dean of the Graduate School*

James L. Price, Jr., Ph.D., *Vice Provost and Dean of Undergraduate Education*

Craufurd David Goodwin, Ph.D., *Vice Provost and Director of International Programs*

Benjamin Edward Powell, Ph.D., *Librarian*

Clark R. Cahow, Ph.D., *University Registrar*

Rufus H. Powell, LL.B., *Secretary of the University*

Stephen Cannada Harward, A.B., C.P.A., *Assistant Secretary and Assistant Treasurer*

Victor A. Bubas, B.S., *Assistant to the President*

Edwin Constant Bryson, LL.B., *University Counsel*

Undergraduate Administration

James L. Price, Jr., Ph.D., *Vice Provost and Dean of Undergraduate Education*

Hugh M. Hall, Ph.D., *Assistant Provost and Dean of Trinity College*

Juanita M. Kreps, Ph.D., *Assistant Provost and Dean of The Woman's College*

William J. Griffith, A.B., *Assistant Provost and Dean of Student Affairs*

Harold G. Wallace, A.B., *Student Adviser, Assistant to the Dean of Undergraduate Education*

Trinity College

Hugh M. Hall, Ph.D., *Dean*

Robert B. Cox, M.A., *Associate Dean*

Peter F. Carbone, Jr., Ph.D., *Assistant Dean*

Gerald L. Wilson, B.D., M.A., *Assistant Dean*

Alan W. Jenks, Th.D., *Dean of Freshmen and Assistant Dean*

Richard L. Cox, B.D., Th.M., *Dean of Undergraduate Men*

The Woman's College

Juanita M. Kreps, Ph.D., *Dean*

Jane Philpott, Ph.D., *Dean of Undergraduate Instruction*

Virginia S. Bryan, Ph.D., *Assistant Dean of Undergraduate Instruction*

Annie Leigh Broughton, M.A., *Assistant Dean of Undergraduate Instruction*

Paula R. Phillips, A.B., *Dean of Women*

Lillian A. Lee, M.S.Ed., *Assistant Dean of Undergraduate Women*

The School of Engineering

George W. Pearsall, Ph.D., *Acting Dean*

Edward K. Kraybill, Ph.D., *Associate Dean for Undergraduate Study*

The School of Nursing

Ann M. Jacobansky, R.N., M.Ed., *Acting Dean*

Kathryn M. Crossland, R.N., Ed.D., *Director of Undergraduate Studies*

Ella. E. Shore, M.R.E., M.A., *Dean of Student Affairs*

Counseling, Health Care, and Other Services for Students

There are a number of resources within the University upon which undergraduate students may rely for counseling and information relating to both academic and personal matters. In addition, the University provides a variety of services for students in areas such as health care, counseling and registration for postgraduate employment, and others. Some of these resources and services are available through the offices of the individual colleges; others are provided by University-wide offices and departments.

Administrative Offices of the Woman's College and Trinity College

The Deans of the Colleges

In The Woman's College and Trinity College, the dean of the college has overall responsibility for the educational and residential experiences of students within the college. Such responsibility involves the dean in relationships not only with other administrative officers and the faculty, but also with individual students and student organizations concerning a variety of academic, residential, and other matters of student concern. Students in each college are encouraged to confer with the dean as the need may arise.

The College Staffs

Associated with the dean of each college are a number of administrative officers, some of whom engage primarily in academic counseling of students, others in developing the residential program of the college. The following paragraphs indicate the nature of the assistance which students may obtain from the several offices in the respective colleges.

Academic Deans. In each college, academic deans work with students and members of the academic departments in helping students to establish programs of study relevant to their interests and abilities. Their offices also serve as clearing houses for many procedures such as approval of leaves of absences, courses to be taken elsewhere, the dropping and adding of courses, withdrawal from college, and similar matters. A dean of freshmen counsels with students before they arrive on campus by means of the *Academic Guide for Freshmen*, and through correspondence in the summer assists them in the selection of preliminary programs of courses for the fall semester. He (she) also plans and directs the orientation program in Freshman Week, assists in directing the faculty advisory program for freshmen, and is available to freshmen for counseling throughout the year. Upperclassmen in each college may seek counsel with deans designated for sophomores, juniors, or seniors for academic advice and information not readily available from departmental advisers and other offices within the University. For example, sophomores who have not declared their majors may obtain information and counsel in the choice of majors from the dean for sophomores; seniors may verify their plans for completing graduation requirements with the dean who counsels senior students. Each academic dean is prepared to advise students regarding various college and University programs and preparation for professions and careers, but specialized counseling and other assistance with respect to certain programs and professions is available from designated members of each staff. For example, certain deans are designated to give special attention and assistance with respect to study abroad, living-learning programs, premedical and pre-legal programs, and postgraduate awards, such as Fulbright Scholarships, Danforth Fellowships, and others. A premedical and predental adviser on the Trinity College staff is available to all undergraduates (men and women) desiring his assistance, including the compilation and processing of references and records for submission to medical and dental schools. A member of The Woman's College staff, assisted by the Directions for Educated Women Committee, gives special attention to career planning for women. Information concerning special counsel within each college may be obtained from the office of any academic dean.

The Dean of Men and The Dean of Women. The Dean of Men and the Dean of Women are concerned primarily with the personal well-being of students and with developing on each campus a residential com-

munity supportive of the best educational experience. (In Trinity College and the School of Engineering, the Dean of Freshmen also has responsibility in these areas.) In carrying out their responsibilities, the Dean of Men and Dean of Women and their assistants work closely with residence counselors and representatives of student governments and residential organizations on each campus. In their offices, room assignments and room changes are made, social functions are registered, the use of college facilities is approved and scheduled, and other non-academic matters are handled. Students may discuss with either dean personal problems of any nature.

In Trinity College, the Assistant to the Dean of Men has special responsibilities related to the various living groups on West Campus.

In The Woman's College, students are aided by the Assistant Dean of Women in finding part-time employment. All students in The Woman's College who are employed either on- or off-campus, whether they are aided by the dean's office or not, are requested to register this fact with the Assistant Dean of Women.

Adviser to Minority Group Students. A special Assistant to the Dean of Undergraduate Education serves the University community in counseling black students and others enrolled in the schools and colleges, as well as administrative colleagues, faculty, and resident counselors who work with the students.

Residential Staffs and Counseling ***The Woman's College***

House Counselors. The house counselors are members of the administrative staff of The Woman's College and are directly responsible to the Dean of Women. They share with the students the responsibility for the satisfactory administration of the house and its program. Since the house counselor has an apartment in the dormitory, she is the College representative most readily available to resident students. If she is not in her own apartment, the receptionist at the house desk knows where she can be found. When she is out of reach, her counterpart in another house or the Dean of Women may be called. Should a student need specialized advice or counsel, the house counselor promptly refers her to the appropriate person or service.

Freshman Advisory Council. This student council is composed of rising juniors and seniors who are selected for qualities of responsibility and leadership. The academic dean who counsels freshmen serves as their adviser. Each member of the FAC is assigned to a small group of freshmen within her house. During Freshman Week she welcomes her group and acquaints them with the College and the University. Throughout the year she remains a resourceful friend for her group.

Faculty Associates. These faculty members are elected by each residential house on The Woman's College Campus. Although they do not

live in the houses, they and their families are closely associated with the life of the house. They attend social events, and often participate in or lead discussions or otherwise contribute to programs of the house. A faculty associate may or may not be a faculty adviser assigned to the house (see section on Faculty Advising).

Trinity College

Assistant to the Dean of Men and Supervisor of the Men's Residential Program. Working with both the Dean of Men and the Dean of Freshmen, the Supervisor of the Men's Residential Program, who is also an assistant to the Dean of Men, is directly responsible for the living-group programs of West Campus. He serves as an adviser to the Freshman Cabinet, the Executive Council of the Association of Independent Houses, and the Interfraternity Council. He is also in charge of the housemasters who advise in each of the freshman houses and the resident fellows who serve a similar function in the independent houses.

House Staffs. Housemasters, assistant housemasters, and resident fellows are members of the administrative staff of Trinity College. Housemasters are graduate or professional students who supervise the program of the freshmen houses. They are assisted by one or more assistant housemasters who share in this responsibility. Assistant housemasters are generally upperclassmen. A resident fellow is a graduate student who advises a cross-section independent house. All of these residential staff members have rooms or apartments within the residence hall to which they are assigned.

Fellows of Trinity College. A member of the faculty is assigned to each freshman and independent house and to some of the fraternities to share in the life and program of the living group. He may advise on academic matters, meet with members of the house to discuss their concerns, and in other ways relate to them as mentor and friend.

Administrative Offices of the School of Engineering

Dean. The Dean of The School of Engineering has overall responsibility for the School and the educational experience and welfare of its students. He works with various officials of the University on matters of general policy and delegates responsibilities within the School to members of his staff.

Associate Dean. The Associate Dean for Undergraduate Study has responsibility for academic matters pertaining to undergraduates, and for working with the academic departments in helping to establish students' programs of study. He counsels with freshmen before they arrive on campus via the *Academic Guide for Freshmen* and, through summer

correspondence with them, assists in making a preliminary selection of courses for the fall semester. He also plans and directs the orientation program of the freshmen. Under his supervision selected engineering faculty members serve as advisers to students. The office of this dean also serves as a clearing house for many procedures such as approval of leaves of absences, courses to be taken elsewhere, the dropping and adding of courses, withdrawal from the School, and similar matters.

Dean of Men. The Dean of Men and his associates work with engineering students in non-academic matters.

Administrative Offices of the School of Nursing

Dean. The Dean of the School has overall responsibility for the educational and residential experiences of the students within the School. Such responsibility involves the dean in relationships not only with other administrative officers and faculty, but with individual students in a variety of academic, residential, and other matters of student concern.

The Director of Undergraduate Studies. The Director of Undergraduate Studies has responsibility for academic matters pertaining to undergraduates, and for working with the academic departments in helping to establish students' programs of study. She counsels with freshmen before they arrive on campus via the *Academic Guide for Freshmen*, and through summer correspondence with them, assists in making a preliminary selection of courses for the fall semester. She also plans and directs the orientation program of the freshmen. Under her supervision a group of selected nursing faculty members serves as advisers to all undergraduate students. This office also serves as a clearing house for many procedures such as approval of leaves of absences, courses to be taken elsewhere, the dropping and adding of courses, withdrawal from the School, and similar matters.

Dean of Student Affairs. The Dean of Student Affairs is primarily concerned with the health, safety, and personal well-being of the students and with developing a residential community supportive of the best educational experience. In carrying out her responsibilities, the Dean of Student Affairs works closely with house counselors, student government, the judicial board, and various officials in student personnel services in the University. Students may discuss with this dean personal problems of any nature.

House Counselors. The three house counselors are members of the administrative staff of the School of Nursing and are directly responsible to the Dean of Student Affairs. They are residents of the dormitory and are readily available to students. One of these persons is officially on duty at the hours when the the Office of the Dean of Student Affairs is closed to provide general counseling service. Should a student need

specialized advice or counsel, the house counselor promptly refers her to the appropriate person or service.

Faculty Advising

Apart from academic counseling obtained by students from faculty members whom they come to know on an informal basis, faculty advising of undergraduates in Trinity, The Woman's College, and the School of Engineering takes place in three primary ways. First, in The Woman's College and Trinity College, faculty members serve as general academic advisers to groups of freshmen (and sophomores who have not declared their majors) in each of the dormitories, and are available for individual conferences during the semester, especially before each preregistration and registration period. In the School of Engineering, freshmen and sophomores are counseled by special faculty advisers before the students choose their major fields. Second, faculty advisers in each academic department counsel with students majoring in that department. And third, in all departments the director of undergraduate studies, and, in most departments, a supervisor of freshmen instruction are available to assist students concerning the more technical academic matters pertaining to their departments. In the School of Nursing, members of the nursing faculty assume responsibility for both general and major academic advising. Each entering freshman student will be assigned an adviser who will counsel the student throughout the undergraduate program.

During Freshman Week in September, freshmen discuss with their general faculty advisers the preliminary course selections made in the summer months and obtain approval of final course programs for the fall semester. Thereafter, periodic conferences are held with the advisers, particularly in the week preceding preregistration in the fall and spring semesters, at which time the advisers approve course programs for the following semester.

Until a student declares his major—at the earliest, in the spring semester of the freshman year or, at the latest, in the spring semester of the sophomore year—he is counseled in academic matters by his dean and the general faculty adviser whom he meets in Freshman Week. Upon declaring his major, a student is assigned an adviser in his major department who thereafter is responsible for advising the student about course choices, career plans, and graduation requirements, and who must also approve the student's course program at each preregistration period. The director of undergraduate studies in each department is also a source of information and advice about curricular and other departmental matters. The academic deans provide assistance to upperclassmen as explained in earlier pages of this *Bulletin*.

The University Counseling Center

The University Counseling Center provides a counseling service designed to assist individuals in gaining a better understanding of themselves and of the opportunities available to them and to aid them in developing more effective problem-solving skills. The professional counselors do not attempt to impose solutions on the individual. They provide information the individual needs to make judicious decisions and help him work out his own problems in ways that will be satisfying to him. The following are some of the areas in which the counseling services offered by the Center have been found to be helpful: choosing a career; planning educational programs leading to careers; identifying and overcoming educational deficiencies; developing greater self-understanding; developing more effective social relationships.

The Counseling Center has available a wide variety of tests which may be employed in the counseling process. These tests provide measures, among others, of general ability, scholastic aptitude, special skills, achievement interests, and levels of adjustment. In the process of counseling, the counselee may, with the help of the counselor, choose those tests that may provide information he needs to make decisions.

Counseling undertaken in the University Counseling Center is confidential between the counselor and counselee. The Center releases counseling reports only to those persons specifically designated in writing by the counselee.

Offices of the Chaplain and Religious Life Staff

The Chaplain of the University. The Chaplain has special responsibility for the Duke University Chapel and also serves as Director of Religious Life. The religious life staff consists of the director, two associate directors, and the chaplains of the several faiths.

Associate Directors of Religious Life. The associate directors of religious life serve as advisers to the Y.M.-Y.W.C.A. and counsel with students on questions of religion and faith. They and the chaplains entertain inquiries about ethics and moral standards as well as personal problems and conflicts.

Office of Placement Services

The Office of Placement Services is the liaison between the University community and potential employers in business, education, and government. Its concern is to help all Duke students obtain employment consistent with their qualifications, interests, and desires. The Office arranges initial interviews with representatives from business and industry, schools

and colleges, government agencies, and graduate schools, and maintains a complete file of job openings.

Seniors interested in the Office of Placement Services should register early in the year. Personal interviews with members of the staff are available to seniors after they have registered.

Information about summer employment is available to all students. An extensive list of summer openings is maintained and occasionally interviews for these jobs are arranged on campus.

Financial Aid Office

The Financial Aid Office administers the University's program of financial assistance to students who are unable to defray the entire cost of college. Within the limits of available funds, the Office provides assistance, on the basis of a student's demonstrated need, in the form of scholarships, grants-in-aid, loans, and part-time employment. Students wishing to apply for financial aid or needing counsel regarding their qualifications for such assistance should contact the Financial Aid Office.

Student Health Service

The aim of the Student Health Service is at all times to bring about and maintain a climate of good health (both physical and mental) on the campus. To further this aim, there are services and facilities specifically designed for student use, and, when necessary, the Student Health Service has immediate access to all services available in the entire Duke University Medical Center.

The facilities of the Student Health Service are available year-round to all currently enrolled full-time undergraduate students as well as to regularly enrolled students in the graduate and professional schools.*

The main components of the Health Service include the Student Health Clinic in the Marshall I. Pickens Rehabilitation Center, located at the corner of Trent Street and Erwin Road, and the Infirmary on the East Campus. For treatment of most illnesses or injuries, students should first contact the Student Health Clinic. The campus bus makes regular runs to the Rehabilitation Center; however, if required, emergency transportation can be obtained from either the Duke Campus Police or the Durham Ambulance Service. Residential staff personnel should be consulted whenever possible for assistance in obtaining emergency treatment.

Services. The following are services provided by the Student Health Center:

* Health policies relating to students in the School of Nursing are found in *The Charge*.

1. Unlimited outpatient visits to the Student Health Clinics.
2. Routine laboratory and X-ray examination needed to diagnose acute illness or injury.
3. Hospitalization in either Duke Hospital or the Infirmary for treatment of acute illness or injury. (Limited to a maximum of thirty days per regular semester, six days per summer session.) Special duty nurses, if required, will be provided at the student's expense. (If students have insurance providing hospitalization, surgical, or medical benefits, the benefits shall be applied to the cost of their medical care.)
4. Most drugs required for the treatment of acute illness or injury. Students will be charged for drugs not provided by the Health Service and will be so informed, as necessary, generally in advance. Blood transfusions are provided at extra expense.
5. Consultations with specialists in the Duke University Medical Center as required for the diagnosis and treatment of acute illness or injury. Such consultation visits *must be authorized by a Student Health Service physician in advance*, except in the case of emergency.
6. Certain periodic health examinations, such as for practice teaching, scholarships, and educational programs can be obtained without charge and *by appointment* with Student Health Service physicians. Other examinations such as for regular employment, travel abroad, insurance, etc., can be arranged, but will be provided at the student's expense. Students are urged to discuss their routine physical examination requirements with the Health Service physicians in order to prevent possible misunderstanding.
7. Immunizations as required for the general protection of the student body will be provided free of charge. Immunizations required for other reasons (travel abroad, employment, etc.) can be arranged at cost. Clarification on this point can be obtained at the Health Service.
8. Regular injections, as in the treatment of allergic conditions, can be scheduled at no extra charge through the Health Service; however, the student must provide the vaccine required which then can be stored in the Health Service Clinic. Diabetics requiring daily Insulin injections are expected to perform these personally.

The following services are not handled by the Student Health Center:

1. Routine eye examinations, lens prescriptions, or care of contact lens problems. (Treatment for acute eye disease or injury is, of course, provided.)
2. Routine dental care. (Emergency treatment as for infection or pain is provided on a limited basis.)
3. Skin disease other than of acute or disabling nature.
4. Elective treatment or elective surgery. (This is sometimes difficult to define categorically. Students are urged to discuss their individual

situations with the Health Service physicians *before* assuming that a certain problem will or will not be cared for through the Health Service.)

5. Treatment of pre-existing or chronic conditions. (Again, definitions can be difficult, and discussion is encouraged.)
6. Private physicians' fees other than consultation fees authorized through the Student Health Service. Students always have the option of employing private physicians of their own choosing; indeed students with known and pre-existing medical problems are encouraged to do so. However, financial responsibility in such instances rests with the student.
7. Treatment of accidents or illnesses occurring during vacations or while off campus is not included in this service. A special commercial policy available only to regularly enrolled Duke students furnishes complementary protection, if desired.
8. Care of dependents or conditions related to pregnancy.
9. Long-term psychiatric care. Acute psychiatric care requiring hospitalization is provided and is subject to the same limitations as for other illness. *Advisory psychiatric consultation* on an outpatient basis is available at no extra expense to students through the Student Health Office.

It should be emphasized that students requiring health services not provided through the Health Service can obtain information at the Health Service as to how services can be most easily obtained.

Residential Accommodations and Regulations

Residential Facilities

The Woman's College

Thirteen residence houses afford both single and double rooms, although there are few singles in some of them. Students from all four classes reside in most of the housing units. Two of the houses are limited to living-learning projects where upperclassmen are grouped together according to special interest. One of these residences houses a coeducational experimental college project for students who are engaged in independent study and/or related course work. One floor of the Graduate Center, which is located on the West Campus near the dormitories of the School of Nursing, houses approximately 120 Woman's College students. (Another section of the Graduate Center is occupied by graduate women students and the remaining section of the building is assigned to men students enrolled in the graduate and professional schools.)

Entering students may state dormitory and room type preference; however, as returning students have first choice of rooms, no guarantee is made concerning room assignments. After the initial assignment students

must themselves make arrangements for roommates from among their friends or accept single rooms.

Dormitory accommodations are provided during Thanksgiving and spring vacations and the greater part of the Christmas holidays, but all houses are closed between the spring and summer sessions.

Trinity College and the School of Engineering

The Men's Residence Halls on West Campus are divided into forty-three living groups. These groups are of three major types: all-freshman houses, independent cross-section houses, and fraternity sections. The nine all-freshman houses, eleven of the independent cross-section houses, and four of the fraternity houses are open to freshmen.

The all-freshman houses are located in Kilgo and Crowell Quadrangles and accommodate approximately two-thirds of the freshman class. Each of these houses elects its own officers and council and organizes social, intramural, and other types of programs. A housemaster, a graduate or professional student, assisted by several upperclassmen who serve as assistant housemasters, guides the program of the house. A faculty member who serves as a fellow of Trinity College, works closely with the program of each house and is available for individual and group advising.

After the freshman year, all fraternity men are required to live in fraternity sections. Men who do not affiliate with a social fraternity may choose from among the thirteen independent, cross-section houses. Each of these houses has its own officers and its own programs. These programs include discussions with faculty members, seminars, film festivals, as well as social and athletic events. Each house is staffed by a resident fellow, a graduate or professional student, who advises the house. He has a room or suite in the house. Each independent house, like the freshman houses, has a fellow of the College assigned to it.

It is the aim of the University to provide through its residence halls program not only comfortable lodging, but opportunities for informal learning and the enrichment of the total educational experience.

The School of Nursing

School of Nursing students presently live in Hanes House and Hanes Annex which have double and a few single rooms. Entering students may state room type preference; however, since returning students have first choice of rooms, no guarantee is made concerning room assignments. After the initial assignment, students themselves make arrangements for room selection and roommates through the Office of the Dean of Student Affairs.

Resident house counselors, who are on the staff of the Dean of Student Affairs, live in the dormitories and are responsible, with the cooperation of the student government, for their administration.

Dormitory accommodations are provided at the University during Thanksgiving and spring vacations and part of the Christmas holidays, but all houses are closed during the summer sessions. Nursing students are housed on West Campus for the summer.

Living Off-Campus

Normally all undergraduate students, with the exception of those who are married or whose homes are in Durham, are required to live in University Residence Halls. However, overcrowded conditions especially in the men's dormitories, have made it necessary to permit a limited number of students to live off-campus. Men students above the freshman level and senior women students who wish to live off-campus should apply for such authorization from the Dean of Men, the Dean of Women, or the Dean of the Student Affairs of the School of Nursing, as appropriate.

Male undergraduate students beyond the normal fourth year of the undergraduate program cannot be guaranteed space in the dormitories.

Dormitory Procedures

Rental Procedures. A \$25.00 room deposit is required before a student may reserve a room. Once a student matriculates, the deposit is held for the entire period of his academic enrollment.

Rooms are normally rented for the academic year; rental payments, however, may be made by the semester. All payments must be made in advance to the Bursar. After the day of registration, room rent will not be refunded except to those students who withdraw involuntarily to enter the Armed Services of the United States.

See the section on Financial Information concerning room rent and conditions under which the \$25.00 room deposit is refundable.

Occupancy. Rooms within the residence halls may be occupied by freshmen on the first day of Freshman Week and by upperclassmen forty-eight hours before the day classes commence. Any exceptions for occupancy of rooms before these dates depend upon authorized assistance in the Freshman Week program.

Keys. Upon arrival each year each student will be provided with a room key. A \$5 refundable key deposit is required at the time the key is issued. At the end of the occupancy period a student is required to return the key to the place of issue at which time the deposit will be refunded.

Vacating Procedures. All rooms must be vacated twenty-four hours after the last day of final examinations or official withdrawal from the University (except that those students who are graduating may remain until twenty-four hours after Commencement exercises).

Students are required to obtain written authorization from the Dean

of Men or the Assistant Dean of Women or the Dean of Student Affairs of the School of Nursing to remain in the residence halls longer than the twenty-four hour period mentioned above.

A student must remove all personal effects from his or her room prior to termination of his room contract.

Room Changes. Unless authorized, room changes make the student liable for rent for each room for the period involved.

Women make room changes by prearrangement with the house counselor and the authorization of the Assistant Dean of Women, or in the School of Nursing with the Dean of Student Affairs.

Men make room changes by prearrangement with the living group housing chairman, resident fellow, or housemaster, and the Dean of Men. No charge will be made for these changes until October 1 for the fall term or until February 16 for the spring term. After these dates, a charge of \$2.00 will be assigned for room changes.

Vacancies in Women's Residences. Since only limited vacancies occur in women's residences, each situation is treated independently by the Assistant Dean of Women or the Dean of Student Affairs in the School of Nursing in accordance with established procedures.

Vacancies in Men's Residences. Rooms are usually rented as doubles and singles. If necessary, some rooms may be temporarily set up for multiple occupancy. Such rooms will be changed as soon as possible to their original status, as double or single rooms, and the remaining occupant(s) required to pay the cost differential. A student remaining alone in a single/double room from which an occupant has vacated will be given an opportunity to move to a double room if he so desires. Once unexpanded, rooms may not be re-expanded during the same school year except by special permission of the Dean of Men.

When a vacancy occurs in a normal occupancy room in an established living group, the designated authorities of that living group will be notified by the Dean of Men and will be expected to consult with the remaining occupant and fill the vacancy within one week of notification. If the vacancy is not filled within that time, the vacancy may be filled by the Dean of Men. If this vacancy cannot be filled in either of the above described manners, then the remaining occupant will be required to:

- a. Move to another room in the same dormitory in which a vacancy exists, or
- b. Arrange to pay the prorated differential cost resulting from the vacancy, or
- c. In the spring semester only, and only if there are excess vacancies on-campus, the Dean of Men may, if circumstances warrant, recommend assignment of one man to a double room when a single room is desired and none are available within a living group.

When a vacancy occurs in a normal occupancy room in an area not

reserved for a special living group, the remaining occupant will be expected within a week after official notification by the Dean of Men either to:

- a. Select a roommate or accept a roommate, if available, assigned by the Dean of Men, or
- b. Move to another room in which a vacancy exists, or
- c. Arrange to pay the prorated differential cost resulting from the vacancy, or
- d. In the spring semester only, option c above may be applied upon the recommendation of the Dean of Men.

Student's Possessions in Rooms

The following items are not permitted in rooms in the residences:

1. Furniture other than that provided in the residence halls by the University unless approved by the director of housing management. (Exceptions are small radios, phonographs, or television tables which are permissible without reference to the Department of Housing Management.)
2. Pets of any sort.
3. Cooking appliances, except electric coffeemakers with self-contained elements.
4. Personally owned refrigerators.*

Special equipment necessary for medical reasons will be authorized by the Dean of Undergraduate Men or the Assistant Dean of Undergraduate Women, or the Dean of Student Affairs of the School of Nursing, as appropriate, on receipt of verification of need by the Student Health Service.

Care of Rooms and Adjacent Campus Areas

Though limited maid service is available, a student is responsible for the care of his or her room and furnishings and is required, as a condition of occupancy, to keep the room reasonably clean and orderly. The University reserves the right for Housing Management, as well as custodial and maintenance personnel, to enter and to inspect at reasonable hours the condition of any student's room in accordance with the current privacy policy.

Nails, screws, tacks, or adhesives on the plastered walls or woodwork of the residences are prohibited. If vinyl covering is installed on room walls, adhesive materials, but not nails, screws, or tacks may be used

*A limited number of small refrigerators are available for rental by the University to undergraduate men only. Men students will be notified of rental procedures. One fourth of the units available are reserved for freshmen.

for picture hanging. The utilities, wiring, locks, or screens should not be altered in any way. No student shall remove University furniture or equipment from his room.

Games or other activities which may damage lawns or shrubbery adjacent to residence halls are not permitted.

No student shall enter custodial, utility, or maintenance spaces within the residence halls unless accompanied by University-authorized custodial or maintenance personnel. Use of roofs is not authorized.

Routine complaints and requests pertaining to maintenance and services should be reported to the housekeeper in the appropriate residential area.

Damage Charges. Students will be held responsible for damage that occurs in their rooms even though they may be absent at the time. Any repair costs will be assessed the occupant(s) of the room. Any appeal for reassignment of costs should be made through the Manager of Residence Halls to the Court of Appeals.

Students must report within five days after moving into a room any earlier damage that has not been repaired in order to be released from financial responsibility. A form used for reporting these damages to the Department of Housing Management will be provided at the time of occupancy.

Storage. Within two weeks after room occupancy, all trunks and heavy luggage must be stored in a storage area designated for each residence. Limited facilities for storing personal effects over the summer are available to students who have preregistered for the fall semester. Non-students or students living off-campus cannot store their personal effects in the residence halls. Storage will be limited to trunks and boxed items no larger than the average trunk; each student will be expected to arrange for delivery and pick up of his belongings. Each item must be well marked with the owner's name and his permanent mailing address. Receipts will be given at the time of acceptance and must be surrendered by a student upon withdrawal of his items from storage.

Personal Property Insurance. The University assumes no financial responsibility for damages to or loss of personal property. Personal property insurance coverage is recommended for all students.

Trading and Soliciting. Without written permission from the appropriate undergraduate dean, no student, tradesman, or salesman may solicit or sell goods or services in the buildings or on the grounds of Duke University. A student who invites or receives an unauthorized salesman, or who uses his room for any commercial purpose, is liable to disciplinary action.

House Dues, Men's Residences

A student who lives within a dormitory room assigned by the College

to a particular living group and is accepted into the living group according to constitutional guidelines governing the group is recognized as a member of the living group and assumes responsibility for payment of house dues duly assessed by procedures specified in the group constitution. A student who accepts the constitutional guidelines for membership and who decides to live off-campus while maintaining full membership is held responsible for all financial obligations to that living group. Associate membership can be held by a student provided a signed financial agreement between the student and the living group is registered in the Office of the Dean of Men within two weeks after accepting this membership. Any student who accepts membership in a living group and at a later time assumes additional financial obligation to another living group, must continue to assume both of these obligations or move from the house.

Failure to meet the financial obligations noted above will be considered an indebtedness to the University and can result in the application of the usual University sanctions.

Food Services

The Woman's College

All resident women students, except the upperclassmen who are assigned rooms in The Graduate Center on West Campus, are required to contract for their meals in the University Dining Halls on a semester basis. The board privilege is available for upperclassmen who are not required to contract for their meals by making arrangements through the Dining Halls Office. The board fee covers three meals per day during the regular term, exclusive of vacations, and entitles the student to unlimited seconds in the East Campus Dining Halls and a generous allowance on the Men's Campus or The Graduate Center amounting to a 30 percent discount on meals. On the East Campus there are two dining halls. Ordinarily, the students who reside in Southgate and Gilbert-Addoms take their meals in Gilbert Addoms. Students who live in the other East Campus dormitories take their meals in The Woman's College Union. Students who reside in The Graduate Center and who are on the board contract basis take their meals in the dining room in that building.

Provisions are made for The Woman's College students who are on the board basis to take their meals in the Great Hall or the University Room of the West Campus. Their breakfast is restricted to the hours from 9:00 a.m. until 9:30 a.m. The students are asked to use the cashier line designated to them and to have their meal cards punched by the cashier. The allowance for these meals is 60¢ for breakfast, \$1.10 for lunch, and \$1.40 for dinner. It is to be understood that these meals are for

the boarding students only and are not to be given away either in whole or in part to those students who are required to pay cash for their meals. Violations of this matter will result in the withdrawal of the privilege of eating on West Campus.

Meal tickets for guests may be purchased in either of the East Campus Dining Halls and books of meal tickets are sold at a discount.

Snack bar service is available on the East Campus in The Woman's College Store, and on the West Campus in The Cambridge Inn located in the West Campus Union Building, and in the Graduate Center in the coffee lounge.

The charge for board is \$287.50 per semester payable at the time of registration. If a student withdraws during the first six weeks of the semester, a board refund is made on a pro rata basis. If withdrawals occur after that time, no refund is allowed.

Trinity College and the School of Engineering

The dining facilities on West Campus include two cafeterias with multiple-choice menus, the Oak Room which is a service dining hall where full meals and *a la carte* items are served, and a self-service snack bar, The Cambridge Inn, which is open throughout the day and evening. The men students may also take their meals in the Graduate Center Dining Halls by paying cash and in either of the dining halls on the East Campus where a discount may be arranged by buying a book of meal tickets.

The cost for the academic year will approximate \$650.00 but would vary from this amount depending upon the individual. If requested, optional meal ticket books of scrip in \$10.00 denominations may be obtained from the Dining Halls Office, 106 Union Building, West Campus; the bill will be sent home monthly. To arrange this, parents should send a letter of authorization to Mr. T. W. Minah, Director of Duke University Dining Halls.

The School of Nursing

Freshmen and sophomores in The School of Nursing are required to contract for their meals in the University Dining Halls on a semester basis. The board privilege is available for upperclassmen who are not required to contract for their meals by making arrangements through the Dining Halls Office in The Graduate Center.

The board fee covers three meals a day during the regular term, exclusive of vacations, and entitles the student to eat in the Dining Halls of the Graduate Center, the East Campus Dining Halls, or the University Room and Great Hall of the West Campus Dining Halls.

A meal ticket is issued to each boarding student at the beginning of the month and this ticket is punched by the cashier in the dining hall. The

allowances for meals in The Graduate Center are: 60¢ for breakfast, \$1.25 for lunch, and \$1.40 for dinner. This represents a total value of \$386.75 per semester, whereas the board charge is \$287.50 per semester. When eating in any of the dining halls on East Campus, the boarding student is entitled to unlimited seconds. When eating on West Campus the same meal allowance as permitted in the Graduate Center applies. It is to be understood that these meals are for the boarding students only and are not to be given away either in whole or in part to those students who are required to pay cash for their meals. Violation of this matter will result in the withdrawal of the privilege of eating on West Campus.

Meal tickets for guests may be purchased in either of the East Campus Dining Halls and books of meal tickets are sold at a discount.

The charge for board is \$287.50 per semester payable at the time of registration. If a student withdraws during the first six weeks of a semester, a board refund is made on a pro rata basis. If withdrawals occur after that time, no refund is allowed.

Student Life

Duke University expects and requires of all its students full cooperation in developing and maintaining high standards of scholarship and conduct. Each student is subject to the rules and regulations of the University as currently in effect or, from time to time, are put into effect by the appropriate authorities of the University.

Any student, in accepting admission, indicates his willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension or expulsion, for failure to abide by the regulations or for other conduct adjudged unsatisfactory or detrimental to the University.

Responsibility for prescribing and enforcing rules and regulations governing student conduct rests ultimately with the Board of Trustees of Duke University and, by delegation, with administrative officers of the University and of the several schools and colleges. In each of the undergraduate colleges, as well as in the University as a whole, many of these rules have been established over the years by cooperative action between students and administrative officers and, in the case of some rules, with participation of faculty members as well. Representative student organizations, such as student governments and judicial boards, and more recently, community-wide bodies of students, faculty, and administrators, have initiated proposals for policies and rules necessary to assure satisfactory standards in academic and non-academic conduct; and these proposals have been accepted by college and University officers and have become a substantial, if not all-inclusive, body of rules governing student life at Duke.

Similarly, the enforcement of rules in the undergraduate schools and colleges has traditionally been a cooperative endeavor of students and administrative officers, as well as of faculty members who have participated in review and appeals committees and have advised with college and University officers about appropriate standards and procedures in such matters. A recent review of the University judicial system has resulted in the formulation of new procedures and judiciary bodies for the adjudication of violations of University and college regulations. The judicial structure of the University consists of a University Judicial Board, a Judicial Board for each of the communities within the University, and a Judicial Board for each of the residential units in the University.

The new judicial structure formalizes the tradition of shared participation by various members of the University and college communities which is a valuable part of life at Duke. Its viability, however, is dependent, at the least, upon a continued mutual recognition by all members of the community of the need for high standards of scholarship and conduct, a willingness to exercise the personal and corporate responsibilities that accompany such recognition, and an appreciation of the different roles and responsibilities played by various members who participate in the life of the community. This last factor relates particularly to the role of students in determining and supporting high standards.

The Undergraduate Community

Students in The Woman's College, Trinity College, the School of Engineering, and the School of Nursing constitute an undergraduate community whose members are subject to the Undergraduate Community Code. Violations of the code and certain University regulations are adjudicated before the Undergraduate Judicial Board, composed of representatives of the student body, the faculty, and the administration. The constitution of the board and the procedural safeguards and rights of appeal guaranteed to students are set forth in Appendix A.

The Judicial Code of the Undergraduate Community

The undergraduates of Duke University form a community of men and women assembled for the pursuit of learning. Admission to any of the undergraduate schools or colleges of this University carries with it the assumption of a sense of responsibility for the welfare of the community. Also assumed are obligations on the part of each individual to respect the rights of others and to protect the university as a forum for the free expression of ideas. Therefore, conduct which violates University regulations under the jurisdiction of the Undergraduate Judicial Board (see

pages 22-25), or conduct of the type described below (I-XIII), shall be considered an offense under the Undergraduate Community Code. Such conduct occurring within the bounds of the University is, of course, of primary significance; however, when such conduct occurs outside the University it shall be considered an offense under the Undergraduate Community Code, if it is judged to constitute a threat to the University community, whether or not the offense occasions action by a civil court. Conduct in violation of the Undergraduate Community Code shall be punishable by the sanctions listed on pages 56-57.

- I. Academic Dishonesty.
- II. Assault and Battery.
- III. Theft.
- IV. Knowingly furnishing false information to any University judicial or police authority, or any academic or administrative official of the University acting in his official capacity.
- V. Failure to provide personal identification to any University judicial or police authority, or any academic or administrative official of the University acting in his official capacity.
- VI. Contempt of a University judicial body (including failure to respond to a summons; or to testify when asked to do so, except when one's testimony may be self-incriminating.) See the rights of the accused, Sec. 4.010i(2), Appendix A, page 54.
- VII. Fraud (including falsification or misuse of auto registration, meal tickets, library slips, laundry slips, or student identification cards).
- VIII. Willful and malicious damage to University property, or to the property of members of the University community.
- IX. Disorderly conduct.
- X. Illegal entry into University buildings or rooms.
- XI. Repeated violations of House Codes, or violation of House Codes by an undergraduate not a member of the house.
- XII. Gambling.
- XIII. Obscenity.

University Regulations and Policies

Students should be familiar with the following regulations and policies of the University. Violations of these regulations are matters which are subject to adjudication before the Undergraduate Judicial Board.

Policy and Rules on Drugs

Duke University prohibits its members to possess, use, or distribute illegal drugs, including opiates, barbiturates, amphetamines, marijuana, and hallucinogens, except for legally authorized medical purposes and

scientific research. Both federal and North Carolina laws forbid unauthorized possession and distribution of drugs of the classes specified. In addition, the presence and use of many of these drugs within the University community are contrary to the intellectual and educational purposes for which the University exists.

The University recognizes that ignorance or innocence concerning such drugs threatens the safety of members of its community. It therefore seeks to provide as much information as it can concerning the consequences of harmful drugs. The University recognizes also that the illicit use of drugs may reflect emotional problems and is prepared to assist its members involved in their use through medical and psychiatric counseling. Nevertheless, the University considers a violation of the drug prohibition a serious matter and reserves the right to take action appropriate to the circumstances of each case.

Action taken by the University in all cases of drug violation will be guided by a concern both for the emotional and physical welfare of the person involved and for the maintenance of a suitable educational environment for all members of the University.

Rules governing violations are as follows:

1. Alleged violations of the policy stated in the first paragraph above will be adjudicated by the appropriate deans, or in the case of non-students, by comparable authorities and their appointed delegates. It is expected that deans' staffs will exercise professional judgment in referring indicated cases to University health and counseling services, in keeping with the second and third paragraphs of this policy statement.

2. The two grounds which may constitute occasion for the assessment of penalties are:

- a. Conviction of a member of the University on a drug charge by a court of law.

- b. A finding by the appropriate University tribunal, in conformity with the principle of due process, of sufficient evidence that a member of the University has violated the drug policy.

3. The maximum penalty to be imposed within the University upon a student for the possession or use of marijuana shall be suspension; for the possession or use of other illegal drugs, or the distribution of any illegal drug, the maximum penalty of the University is expulsion. Other members of the University shall be liable to appropriate comparable penalties.

See Appendix E for pertinent sections of federal and North Carolina laws regarding the possession, use, and distribution of drugs.

Possession and Use of Alcoholic Beverages

In the State of North Carolina it is unlawful for persons under twenty-one years of age to purchase, possess, or use certain beverages contain-

ing alcohol. The University neither condones the illegal purchase or use of such beverages by its students nor countenances the serving of them to students under age. Moreover, it prohibits the consumption by any person or persons of these beverages on the University's grounds or in its nonresidential buildings. Within these limits, the University is prepared to leave to the individuals directly concerned the decision whether or not lawfully to possess or drink the beverages in question in the residential unit. The living group remains responsible for the general tone of each area of residence, however, and may by majority vote adopt house regulations more limiting than the laws of the State.

See Appendix D for pertinent sections of the General Statutes of North Carolina regarding the possession and use of alcoholic beverages.

Regulations Regarding Firearms, Ammunition, and Explosives

Students bringing firearms to Duke must register them in the Office of the Dean of Men, Dean of Women, or Dean of Student Affairs of the School of Nursing, as appropriate. Ownership and use of firearms, ammunition, or explosives must comply with all local and State laws. Illegal possession or use of such items at Duke may result in expulsion from the University.

The State of North Carolina requires that all firearms having a barrel length of eighteen inches or less must be registered at the county courthouse. In Durham, this registration is made at the Office of the Clerk of the Superior Court.

Students are not permitted to keep firearms, ammunition, or explosives in their rooms. All firearms belonging to undergraduates must be stored in the West Campus Security Office. Instructions for the storage and use of firearms are given at the time of their registration in the office of the appropriate dean.

Perkins Library Control Desk Inspections

In order to guarantee the orderly functioning of the Perkins Library, for the benefit of all members of the University community, control desk attendants have been established at the Library's principal exit and are authorized to examine all books and other library materials which persons leaving the building may be carrying in hands, briefcases, or bags to determine if they are properly charged. Anyone who refuses to permit his books to be examined may be denied further use of the Library. Student offenders will be reported to the appropriate dean of the University, who is authorized to refer such offenders to judicial boards or to take independent disciplinary action, including penalties, up to and including suspension, appropriate to the seriousness of the offense.

Identification Cards

Undergraduate students are issued two-part identification cards which they should carry at all times. The cards are the means of identification for library privileges, student health services, athletic events, and other University functions or services open to them as University students. Students will be expected to present their cards upon request to any University official or employee.

The cards are not transferable, and fraudulent use may result in loss of student privileges or suspension. A student should report the loss of this card immediately to the office of his or her dean. The cost of a new ID card is \$5.00.

Traffic Regulations

Motor vehicles must be registered annually at the beginning of the fall semester or, if a vehicle is acquired later, within five days after bringing it to the campus. Students in Trinity College, the School of Engineering, and the School of Nursing register their vehicles in the Traffic Office; Woman's College students in the Office of the Dean of Women. The annual registration fee for resident students is \$30.00 for automobiles and \$10.00 for motorcycles, motor bikes, or motor scooters.

Upon registration of a motor vehicle students will receive a copy of the University motor vehicle regulations. Operation of a motor vehicle on the campus is contingent upon compliance with these regulations.

Other University Policies

Policy and Regulations Concerning The Privacy of Students' Rooms

Policy. Students who reside in University dormitories are assured the privacy of their rooms and freedom from the admission into or search of their rooms by any unauthorized persons; however, the University is obligated to maintain reasonable surveillance of the residential areas to promote an environment consistent with the aims of an academic community. To foster these conditions the following regulations are now in effect:

1. Housing Management and custodial personnel may enter assigned rooms at reasonable hours on days designated by their announced schedule for the purpose of carrying out their assigned tasks and functions. Occupant(s) of a room may request in writing that custodial personnel not enter that room for the purpose of cleaning; such personnel may enter on their scheduled cleaning day to inspect such rooms for the purposes stated in this section. Other personnel may enter assigned rooms when accompanied by proper authorization from the appropriate administrative

official (See Section 2 c). This notification, when feasible, shall be posted on the residence hall bulletin board stating what dates rooms will be entered. Maintenance personnel may enter assigned rooms at reasonable hours for the purpose of carrying out their assigned tasks and functions. Employees in the above categories may report on the condition of University facilities and equipment, but are forbidden to report on the personal contents of rooms except as related to damage to rooms or furnishings, or to the overall health and safety of the residence hall population. All personnel in the above category shall have written notice stating those items reported as a result of such inspection. Upon receipt of this notice the occupant is requested to contact the Office of Housing Management within 72 hours to discuss the reported damage. (The written notices must as well advise the occupant that subsequent investigation or repair related to this damage may henceforth occur at any time during the normal work week of Housing Management or Maintenance personnel.

(Note: General rule or enforcement procedures will not be founded on information relating to the personal contents of rooms from personnel mentioned unless such contents are specifically prohibited by University regulations published in advance.)

2. No person, with the exception of those listed in section 1 above, shall enter assigned bedrooms in the residence halls except under the following conditions:

- a. consent of the occupant(s); or
- b. presentation of a properly drawn legal search warrant; or
- c. presentation of a written authorization from the Dean of Men, Dean of Women, Dean of Student Affairs in the School of Nursing, or the Assistant Provost and Dean of Student Affairs, as appropriate, or persons publicly designated to act as their representatives; or
- d. emergency situations of immediate threat to the safety of occupant(s) and/or the residential population.

3. Reports made as a result of inspections related to physical facilities and/or furnishings will be handled by the Department of Housing Management in accordance with the existing residential regulations as published in bulletin form by the University.

4. Written authorization from the deans must specify the reasons for believing such a search is necessary, the objects sought, and the area to be searched. An effort must be made to conduct the search in the presence of the student.

5. The request for a search, if approved by the designated authorities, shall be kept in records with the authorization until the time of the student's graduation and shall be available to the student for examination. These records will be kept completely separate from the student's permanent record. Should the search figure in any trial proceeding within

the University, the authorization shall be attached to the trial record; if no action is taken following an authorized search, notation of this fact shall be filed with the authorization. No action shall be taken in regards to objects found but not specified in the authorization for the search.

6. In the absence of a legally drawn search warrant, no general searches shall be conducted by University personnel except with the possession of the written authorization of these above mentioned deans, stating the reasons for the search and the specific objects sought, or under circumstances deemed to be of extreme emergency by these deans or the officer on each campus in charge of maintenance.

Policy on Use of Segregated Facilities

It shall be University practice not to discriminate in any way on the basis of race, creed, or national origin. This covers official activities sponsored, financed, and controlled by University personnel and campus organizations, whether these activities are held on- or off-campus. If they are held off-campus, they must not utilize facilities where discrimination is practiced. Naturally the University will not attempt to dictate to individual students, faculty members, or private groups how they should conduct their personal affairs.

The above policy applies to all social functions sponsored by undergraduate residence hall and campus organizations. The failure of student groups to comply with this policy may result in suspension of their social privileges. Repeated offenses by campus organizations or fraternities could result in the revocation of their charters or, in the case of independent or freshman houses, the dissolution of the living group.

Release of Student Records

No confidential information contained in student records (academic or otherwise) is released to non-University persons or to unauthorized persons on the campus without the consent of the student. Consent is evidenced by each student's signing a form which authorizes the release of personal data. The form may provide for the release of information to one or more persons or agencies only, or it may be a blanket release. Blank forms to authorize or revise the permission are available in the Offices of the Dean of Men, Dean of Women, and Dean of Student Affairs in the School of Nursing, as appropriate.

Campus Trespass

Except for through traffic using the drive between the East and West campuses, the Woman's College campus is closed at night to non-resi-

dents after 2:00 a.m., unless the visitor is accompanying a resident woman student as she returns to the campus.

Violators are liable to arrest by Campus Security Officers, who are commissioned by the Governor of the State of North Carolina as law enforcement officers, and to prosecution as trespassers.

Policy and Regulations on Pickets, Protests, and Demonstrations

Statement of Policy. Duke University respects the right of all members of the academic community to explore and to discuss questions which interest them, to express opinions publicly and privately, and to join together to demonstrate their concern by orderly means. It is the policy of the University to protect the right of voluntary assembly, to make its facilities available for peaceful assembly, to welcome guest speakers, and to protect the exercise of these rights from disruption or interference.

The University also respects the right of each member of the academic community to be free from coercion and harassment. It recognizes that academic freedom is no less dependent on ordered liberty than any other freedom, and it understands that the harassment of others is especially reprehensible in a community of scholars. The substitution of noise for speech and force for reason is a rejection and not an application of academic freedom. A determination to discourage conduct which is disruptive and disorderly does not threaten academic freedom; it is, rather, a necessary condition of its very existence. Therefore, Duke University will not allow disruptive or disorderly conduct on its premises to interrupt its proper operation. Persons engaging in disruptive action or disorderly conduct shall be subject to disciplinary action, including expulsion or separation, and also to charges of violations of law.

Rule. Disruptive picketing, protesting, or demonstrating on Duke University property or at any place in use for an authorized University purpose is prohibited.

Definition. Disruptive picketing, protesting, or demonstrating consists of any conduct which directly interferes with the orderly operation of the University or with the lawful pursuits of any member of the University community or any person otherwise on University premises with the express or implied permission of the University.

Without in any way limiting the scope of the foregoing definition, the following actions are specifically prohibited:

- a. Unauthorized occupancy of University facilities or buildings.
- b. Interference with the rights of students, faculty, or staff and persons who are guests of the University to gain access to any University facility for the purpose of attending classes, participating in interviews, conferences, or any other proper purpose.
- c. Interference with the orderly operations of the University, by

breach of the peace, physical obstruction or coercion, or by noise, tumult, or other forms of disturbance.

- d. Interference with University traffic, be it pedestrian or vehicular traffic.

Implementation. Violation of the rule stated above shall lead to appropriate disciplinary action. Charges of such violations may be brought by the President or his delegated representatives. Lack of prompt response to a cease and desist order by the President or his representative will constitute an aggravation of the offense.

Hearing and Appeal. Cases arising out of violations of the Pickets and Protests Regulations will be heard by the University Judicial Board, in accordance with the procedures outlined in Appendix A, pages 44-49. The University Judicial Board shall have jurisdiction over members of the student body, members of the faculty, and administrative personnel of the University not subject to the Personnel Policy Handbook. Hearings will be conducted with regard for academic due process. The decision of the University Judicial Board shall be final if the accused is exonerated or if there is no appeal. In other cases, students may appeal to the President, or in his absence, the Provost, in which case such appeal shall be solely on the record of the proceedings before the Hearing Committee of the University Judicial Board. Argument on appeal shall be on written submission, but the President may, in addition, require oral argument.

Amendments. These regulations on pickets, protests, and demonstrations may be changed or amended by the University at any time but any such change or amendment shall be effective only after due notice or publication. These regulations supersede any regulations heretofore issued on the subject.

Regulations and Judicial Boards for Residential Units

As provided under the judicial structure of the University, each residential unit has a Judicial Board which has jurisdiction over all offenses involving violations of regulations relating to dormitory procedures and social regulations, not covered by the Undergraduate Community Code or the University policies and regulations. The sanctions imposed by these boards are authorized by the appropriate campus community council and can in no circumstances exceed censure. The regulations of the undergraduate colleges and schools over which these boards have jurisdiction are described below. Information about residential judicial structures and procedures common to the undergraduate community appears in Appendix A.

The Woman's College

Philosophy. The individual student is responsible for decisions and choices within the framework of the regulations of the community. The College does not assume *in loco parentis* relationships.

The regulations of The Woman's College are based upon two concepts: The necessity for the community to establish rules governing the way in which a student lives with her fellows, and the principle of the individual's commitment to live under and uphold the system. Some regulations are considered necessary for the protection of the rights and privileges of members of the community. Most of these regulations are enforced by the community itself. The College reserves the right, however, to request the withdrawal of any student who does not uphold its standards of scholarship and conduct, or who by her behavior, in the judgment of appropriate judicial tribunals or University authorities, brings the University or its Woman's College into disrepute.

Formulation and Modification of Regulations. The regulations of The Woman's College are administered and revised by the Community Council of The Woman's College in cooperation with the administrative staff of the College. Any student, or group of students, may recommend a change in the regulations by presenting a petition to the Community Council.

Judicial Structure, Procedures, and Sanctions. A House Judicial Board of elected members of each house handles infractions of regulations by residents of that house, in accordance with the provisions outlined in Appendix A.

Dormitory Regulations. The following hours for dormitory residents are:

Opening hour — 8:00 a.m.

Curfew for first-semester freshmen

(Before the mid-term)

Monday-Thursday — 11:00 p.m.

Friday, Saturday — 2:00 a.m.

Sunday — midnight

(After mid-term)

Sunday-Thursday — 1:00 a.m.

Friday, Saturday — 2:00 a.m.

Any late leaves must be approved by the house counselor. After the first semester of the freshman year, students may have card-keys for their respective houses and may determine their own hours. Card-keys can be obtained from the Office of the Dean of Women, upon payment of a deposit. Loss of a card-key must be reported immediately.

The dormitories are closed at the following hours to men visitors: Monday-Thursday, 11:00 p.m.; Friday, Saturday, 2:00 a.m.; and Sunday, midnight.

Signing Out. In the interest of the student's safety and in order that she may be reached in an emergency, *signing out* is recommended at any time when she is leaving the Duke campus to return after 7:30 p.m. As house desks close for the night at 1:00 a.m., Sunday-Thursday, and at 2:00 a.m., Friday and Saturday, it is most important that sign-outs be registered by those times.

Although all students are urged to complete sign-outs as specifically as possible as to destination, companions, conveyance, and expected time of return, the student who has completed the first semester of the freshman year may simply leave her card to read *out until curfew*, or, if she does not plan to return until the next day, leave it to read *out*.

"Special Leave" from the Campus. The special leave card is a record of the student's whereabouts whenever she is spending the night out of the dormitory or leaves the Raleigh-Durham-Chapel Hill area. It is understood that leaves from the campus are to be exercised within the framework of the residential requirement of The Woman's College.

First-semester freshmen who are spending the night in another Woman's College dormitory or in the Infirmary may simply sign out; otherwise, they must submit their plans for overnights to the house counselor for approval. All other students must assume full responsibility in this regard. If they do not plan to return to the house until the next day, or if they are leaving the Raleigh-Durham-Chapel Hill area, the leave card must be filled out completely as specified. If a change is made in the details as indicated on the card, the student is obligated to notify her house counselor or another appropriate official as soon as she knows of this change.

Although the student is responsible for her own plans, it is expected that she will discuss with her parents any limitations which they feel she should recognize.

A student who plans to be absent from the University for more than a week must consult the appropriate Dean of Instruction or the Dean of Women before leaving the campus.

Visiting in Men's Dormitories. Women may visit in men's dormitories on the West Campus only when visiting hours have been properly authorized by the particular house and by the West Campus Community Council.

Open Houses. Men may be entertained in the living quarters of the dormitories only within house hours and as authorized by majority vote of the residents of the house. The open house must be registered with the house counselor, and other prescribed procedures as posted in the dormitory must be followed. The house assumes full responsibility for each open house.

Meetings in the Dormitory. All meetings held in the dormitory living rooms must be approved by both the house president and the house counselor.

Campus Trespass. Except for through traffic using the drive between the East and West Campuses, The Women's College campus is closed after 2:00 a.m. to non-residents unless the visitor is accompanying a resident woman student as she returns to the campus.

Motor Vehicles. After the first semester of the freshman year all *resident* students, who register their cars (or motor scooters or motorcycles) in the Office of the Dean of Women, may have such vehicles or the continuous use of them.

An annual parking rental fee of \$30.00 for automobiles and \$10.00 for motor scooters and motorcycles is payable upon the registration of the vehicle in the fall.

All *non-resident* students are eligible to have motor vehicles and, upon registration, to have campus parking privileges free of charge.

Use of Dormitory Rooms During Vacations. The College reserves the right to use dormitory rooms for special guests during announced vacations.

It is the established policy of The Woman's College not to use its dormitory facilities for housing convention guests during the academic year.

Guests. A student may have overnight guests in the house only when she has cleared these plans with the house counselor and when she herself will be there to assume the responsibilities of the hostess. She must inform her guest of the College regulations and must assume the responsibility for any infraction of the rules by any guest other than a Woman's College student. No overnight guest may be entertained in the dormitories during Freshman Week or during the examination period.

The College reserves the right to ask a guest to leave if she does not abide by the rules.

Social Functions — Registration. All organized activities, lectures, field trips, conferences, retreats, house and beach parties, etc., must be registered and entered on the official calendar in the Office of the Dean of Women. The chairman of the host group is responsible for this registration.

Marriages. Any student planning to continue her studies at Duke after marriage must inform the Assistant Dean of Women promptly, arrange for off-campus housing, and supply her new address. If the marriage is to occur during the academic year, the Assistant Dean of Women should be informed before the marriage takes place; if prior notification should be impossible, however, the Dean is to be informed of the marriage immediately. The student may forfeit her place in the College if she fails to observe these regulations.

Conferences and Conventions. Invitations to individuals or to organizations outside the University to hold conferences or conventions on The Woman's College Campus must be discussed with and approved by the Assistant Dean of Undergraduate Women well in advance of the ex-

tension of the invitation by the prospective host or host group at Duke. It is the established policy of The Woman's College not to use its dormitory facilities for the housing of convention guests during the academic year.

Trinity College and the School of Engineering

Social Regulations

During the academic year 1968-69, the West Campus Community Council adopted a set of "Guidelines for Social Legislation on West Campus," under which each living group was to establish and enforce its own social regulations. The "Guidelines" specify that regulations of each living group must be formulated and enforced in recognition of "the basic necessities of students, such as provisions for sufficient quiet and privacy for study and sleep during some reasonable part of the night and morning, as well as sufficient time and privacy for bathing and dressing." In addition, they express the Council's conviction that the social regulations and activities of each group must be "supportive of the general welfare of the total university community." Procedures and machinery are required for assuring that the regulations are adopted through "a democratic process" and for protecting the interests of individuals and minority viewpoints within each living group. Further, each group is required to specify the means by which regulations were to be enforced, including judicial machinery for determining violations and assessing penalties. The whole of the "Guidelines" is based upon the premise that "living groups and the individuals they comprise will act responsibly when given authority over their own affairs."

Guidelines for Social Legislation on West Campus

The West Campus Community Council recognizes that the matter of conduct in the residence halls is primarily a student concern. As a result, the Council proposes that each living group on West Campus have responsibility for establishing and maintaining social regulations for its residents, and for assuring the Council that its regulations and enforcement procedures are supportive of the general welfare of the total university community.

The following considerations should be taken into account by the living group governments for establishing regulations and enforcement procedures:

1. The individual and group activities approved by the living group should not interfere with the basic necessities of students, such as provisions for sufficient quiet and privacy for study and sleep during some reasonable part of the night and morning, as well as

sufficient time and privacy for bathing and dressing, i.e., the first responsibility of the members *as students*. To further insure these needs, the living group should see that during the work week no noisy activity is scheduled at times when the majority of members of the house will want to study or when members of the larger community will be disturbed.

- 1a. A living group's regulations must stipulate that no man may have a visitor in his room over the objection of his roommate(s).
- 1b. A living group's regulations must stipulate that there be no loitering of visitors in the halls. Female guests are to proceed directly to their host's room.
2. For purposes of information, all off-campus social functions, and any changes in their schedule, should be registered 48 hours in advance in the Office of the Dean of Men.
3. It is understood that each living group will make, revise, or rescind its social regulations through a democratic process, e.g., at specified times the entire living group membership should have the privilege of voting by secret ballot on such matters. Some machinery must be agreed upon, and published in advance, by which a significant minority can petition to modify existing regulations.
4. The West Campus Community Council shall review each semester the social regulations and enforcement procedures presented by the individual living groups.
5. In addition to the social regulations of the house, each living group must stipulate a unit of the house which is responsible for enforcement of the rules and another unit of different membership which is responsible for determining guilt and penalty. The enforcement unit must have at least one representative from each floor of a section. The house will also see to it that all men residing in the house (such as independents in fraternity sections) share equal vote and equal rights in the enforcement and adjudication of social regulations.
6. Machinery must be established within the men's judicial board to handle men who repeatedly and/or deliberately violate the rules of their houses, and a procedure must be established by which the judicial unit of a living group may bring such offenders before the Undergraduate Judicial Board.
 - 6a. An individual may bring his complaint or appeal directly to the Undergraduate Judicial Board.
 - 6b. Offenses listed in the Judicial Code of the Undergraduate Community are not within the province of the living group judicial structure. The individuals within the house and the house judicial board are responsible for bringing offenders before the proper judicial board.

- 6c. A living group may not vote to overturn a judgment of its house judicial board. Such appeals have to go to the Undergraduate Judicial Board.
7. The living group must have its regulations posted on each floor at all times.
8. Except for temporary special changes in hours, not exceeding a period of 72 hours or during exam period, amendments to this document must be approved by the W.C.C.C. All temporary changes in hours must be reported to the Dean of Men.

This resolution is postulated upon the idea that living groups and the individuals they comprise will act responsibly when given authority over their own affairs. If this is found not to be the case, the West Campus Community Council can at any time rescind this privilege.

The following proposal concerning sanctions on living groups which do not submit regulations and enforcement procedures was passed by the West Campus Community Council on October 22, 1969.

"In accordance with the 'Guidelines for Social Regulations on West Campus,' a living group is not duly constituted until it is operating under its own regulations, passed by the West Campus Community Council, and has established its Enforcement Committee and its Judicial Board.

"Therefore, be it resolved that any living group on West Campus which has not submitted its Regulations to the W.C.C.C. by the set deadline will be recommended by the Council for probation. If, at the end of one month of probation, the living group still has not presented its regulations and enforcement procedures, the Council will recommend to the dean's staff that that living group be officially dissolved, as it is not properly constituted.

"Be it also resolved that Freshman houses will remain under the regulations contained in the *Bulletin of Information and Regulations*, 1969, until they have had their regulations approved, and that these regulations contained in the *Bulletin* be enforced by the Residential Staff."

Living-group rules adopted in the spring, with the exception of those relating to all-freshman houses, shall continue in effect. In the case of all-freshman living groups, the following social regulations adopted in 1968 by the W.C.C.C. shall be in effect pending further recommendations by the W.C.C.C.:

Definition of a Social Function. A social function is defined as: (a) any social event, sponsored by a living group or student organization, which is held on West Campus; (b) any social event sponsored by a living group or student organization at which the expense, or a part thereof, is paid from the organization's treasury.

Registration of Social Functions. All social events are registered in the

Office of the Dean of Men. Regular weekend social events must be registered by 4:00 p.m. on the Thursday before the event is to take place.

Responsibility for Social Functions. For every social function each living group will select a host committee which will be present and responsible for seeing that standards of propriety and good taste and all regulations are observed at all times. This committee should be made up of four men appointed for each specific occasion. The report of the host committee shall include a statement of any violations of these standards. Chaperones are not required for any social function though any group may secure them if it wishes. Freshman houses are expected to have a member of the house residential staff present at each off-campus function.

Women Guests in All-Freshman Men's Dormitories. Women may visit all-freshmen residences in accordance with the rules stated below:

1. Lounges. The freshman lounge in House O is a public area and is open from 8:00 a.m. to 12:00 midnight Sunday through Thursday, and 8:00 a.m. to 1:30 a.m. on Friday and Saturday.

Commons rooms in all-freshman houses are open to women visitors from 12:00 noon to 1:30 a.m., Saturday; 12:00 noon to 12:00 midnight, Friday and Sunday; and 12:00 noon to 6:00 p.m., Monday through Thursday. Each house may modify these hours within the times stated.

On special occasions (such as after basketball games) the closing of commons rooms may be changed to a later hour when authorized by the Dean of Men. Exceptions must be registered at least one day prior to the event. If sufficient interest is shown in advance, an extension may be granted to all houses, in which case an announcement will be made through the freshman housemasters.

2. Open houses. Each occasion for an open house in an all-freshman house must be registered. An affirmative vote of a majority of the living group's members shall be required for each occasion. Each living group requesting an open house shall register this decision on the appropriate form with the Office of the Dean of Men.

Freshmen are permitted women visitors in their rooms during properly registered open houses within the following hours:

Friday — 6:00 p.m. to 12:00 midnight.

Saturday — 12:00 noon to 6:00 p.m.; 8:00 p.m. to 1:30 a.m.

Sunday — 12:00 noon to 5:30 p.m.

Each house may modify these hours within the times stated above.

Motor Vehicles. Students who wish to possess and operate motor vehicles at Duke may do so after registering them at the Traffic Office. Motor vehicles operated by freshman men will be identified by special bumper stickers and are to be parked solely in the area behind the tennis courts on West Campus. Students under twenty-one years of age must have the written consent of parent or guardian before possessing and operating their own motor vehicles at Duke. A standard certificate of automobile liability insurance issued by a recognized company and

evidencing coverage of at least \$10,000 per person, \$20,000 per accident for personal injury, and \$5,000 for property damage is also required. There is a registration fee for resident students of \$30.00 per automobile or \$10.00 per motorcycle, motorbike, or motor scooter for each academic year.

Vehicles must be registered annually at the beginning of the fall semester or, if a vehicle is acquired later, within five days after bringing it to the campus. If there is a change of status which requires that a new registration emblem be displayed or affects the registration fee, a student must re-register his vehicle within five days.

School of Nursing

Principles of Regulations

Upon entering the School of Nursing, students become a part of the Student Government Association (see NSGA Constitution in *The Charge*). The Judicial Board, an integral part of NSGA, has the major role in supervising phases of community living which directly concern the welfare of the student body.

The major concern is with the responsibility that each individual undertakes as a member of the community. The majority of standards of good taste are entrusted to each individual's sense of social responsibility; the preference is to suggest, rather than to dictate, basic standards of community living that contribute to a pleasant, attractive environment in which all students can develop to best advantage. Although it is understood that each Duke student is an individual with a unique social background, it is important that one retains an acute sensitivity to the good of the college society as a whole and to the sense of professional nursing which is developing throughout the college years.

The dormitory is the principal area wherein thoughtfulness and consideration are of prime importance in fostering a pleasant atmosphere. In the use of public areas, particularly, the individual must remember that these facilities serve all the residents of the dormitory. Individual conduct should neither embarrass fellow residents nor infringe upon their rights and feelings.

Formulation and Modification of Regulations

The regulations of NSGA are administered and revised by the Judicial Board in cooperation with the administrative staff. It is the responsibility and privilege of all students to participate in the formulation and modification of the regulations by which they live by offering suggestions, ideas, and criticism. Whenever a group of students desires to have a rule changed, a proposal from 10 percent of the student body should be sub-

mitted to the Judicial Board. A referendum concerning the proposal and involving the entire student body will then be held. If passed by two-thirds majority of the students, the proposal will be approved by the Judicial Board and sent to the administration for final approval.

Regulations of the NSGA

Visiting Men's Residences. Women may visit in men's residences on the West Campus only when visiting hours have been properly authorized by the particular house and by the West Campus Community Council.

Safety After Dark. No institution can guarantee the safety of all students at all times. It is therefore recommended that students exercise caution at times and places known to be hazardous. It is recommended that students not study in a classroom alone or walk alone in unlighted portions of the campus or between campuses after dark. If two or more students are not walking together, the Security Office (Ext. 2444) should be called to request escort service.

Procedures for Taking an Overnight for First-Semester Freshmen. First-semester freshmen wishing to take an overnight should obtain an overnight leave card from the main desk in Hanes House. Students must check (in person) with one of the Judicial Board members to be sure the overnight is covered by the parental permission form which is sent to students at the time of their enrollment.

Students may sign out for East Campus or home without Judicial Board approval. (The location of a student's parents or guardian is considered to be home. If this is not their home address, students must specify this on their overnight leave card.)

If a situation arises which is not covered by the student's parental overnight permission form, she must receive special permission from her parents or guardian. Permission by letter, telegram, or telephone directed to a house counselor or Judicial Board member must be received before the student's plans for an overnight are completed.

If a first-semester freshman finds it necessary to leave the dormitory before 6:00 a.m., she must notify the house counselor ahead of time.

Procedures for Taking an Overnight for All Other Students. All other students will be given the responsibility to take overnights at their own discretion. Before students leave the dormitory, they must complete an overnight leave card and place it into their sign-out slot so that they may be contacted in case of emergency.

Hours. First-semester freshmen will have the following curfew effective from the first through the last days of fall semester classes and during Freshman Week: Sunday-Thursday, 12:00 midnight and Friday-Saturday, 2:00 a.m. Late permission will be available to freshmen for necessary functions which extend beyond their social hours. A late permission is considered to be a privilege and is not to be used indis-

criminally. Permission must be obtained from three Judicial Board members. The student is encouraged to consider carefully the rationale for her request before seeking permission and must be willing to accept the responsibility for her actions.

All students with the exception of first-semester freshmen will be permitted to regulate their own curfews by use of their own key-cards (information about key-cards will be distributed to students in the fall). In the interest of the student's safety and in order that she may be reached in an emergency, *signing out* is recommended at any time when she is leaving the Duke campus to return after 7:30 p.m. As house desks close for the night at 2:00 a.m., it is most important that sign-out be registered by that time. It is recommended that students complete sign-outs as specifically as possible as to destination, companions, conveyance, and expected time of return.

Late Arrivals. Whenever any student realizes that she will not be returning to the dormitory by her designated time, she is expected to notify the house counselor immediately. Students should call 684-3121 (Hanes switchboard) and ask for the house counselor on duty. If there is no answer, the house counselor in Hanes House may be reached by calling 684-8111 (University switchboard).

House Closing. To aid in maintaining a safe dormitory for residents, the house will be closed to non-residents at 12:00 midnight, Sunday through Thursday, and at 2:00 a.m. on Friday and Saturday.

Quiet. Due to the large number of students residing in Hanes House and Hanes Annex, it is unrealistic to assume that all students will follow the same schedule in relation to studying, sleeping, and recreation. Therefore, it is imperative that all students recognize their responsibility to provide an atmosphere in the dormitory which is conducive to the varying activities of their neighbors. It is hoped that all students will respect the wishes of their neighbors in relation to quiet and privacy. All problems should be referred to the Judicial Board for consideration.

Fire Exit Doors. There is a fire exit door located at the back of each of the three wings of Hanes House, and there are three fire exit doors in Hanes Annex. When these doors are opened from the inside, there is no assurance that they will lock even when closed tightly from the outside. If these doors are used after dark, this would then provide an unprotected entrance to the private quarters of the dormitory. Thus, the following regulation is necessary to protect the students residing in Hanes House and Hanes Annex: All fire doors in Hanes House and Hanes Annex are *not* to be used after 6 p.m.

Dress. The first floor of Hanes House serves a dual purpose — a social area for students as well as an office area for the administration and faculty. For this reason, students should not go barefoot in the public areas of the dormitory during office hours (8:00 a.m. to 6:00 p.m., Monday-Friday and 8:00 a.m. to 12:00 noon, Saturday, and they should wear

curlers downstairs during open hours only in transit to the Robot Room via the back stairway. Students of the School of Nursing are expected to exercise mature judgment in deciding appropriate attire and to maintain good conduct in regard to appearance and behavior.

Guests and Visitors. A student must inform her guest or visitors of the regulations of the NSGA and must assume the responsibility for an infraction of these regulations by any guest or visitor other than a School of Nursing student.

Men are not permitted to enter the private quarters of the dormitory except during approved Open-Open hours which may be from 12:00 noon until one-half hour before closing. Specific days and times for Open-Opens will be voted upon at the beginning of each new semester or more often as petitioned by students and must be approved by a two-thirds majority of the residents of the dormitory. During approved Open-Open hours all gentlemen must be escorted upstairs by their hostesses. It is also essential that a hostess have the permission of her roommate to have a male guest in their room.

A student may have women overnight guests in the house only when she has cleared these plans with the house counselor and when she herself will be there to assume the responsibilities as the hostess. It is the responsibility of the hostess to notify the desk receptionist and the house-keeping supervisor of the room assignments and services needed for her guest(s). All guests are to have the same social hours as their hostess. Each hostess is to assume full responsibility for her guest throughout the visit, and will assume any consequences for failure of her guest to abide by these regulations.

Financial Information

Fees paid by students cover only a part of the cost of their instruction and of the operations of the University. Income from endowment and contributions from foundations, alumni and other friends cover the balance, which constitutes more than half of the total cost.

Registration Fee and Deposits for New Students

Upon notification of acceptance new students are required to pay, by a deadline, a non-refundable first registration fee of \$20.00 and to make a deposit of \$50.00. The deposit will not be refunded to accepted applicants who fail to matriculate.

For matriculated students, \$25.00 of the \$50.00 deposit made at the time of acceptance serves as a continuing room deposit and the remaining \$25.00 as a continuing registration deposit. The \$25.00 preregistration deposit is refunded to students (1) who are required by the University to withdraw, (2) who are graduated, or (3) who request the refund at the time of preregistration, thus indicating their intention not to return for the following semester. The \$25.00 room deposit is refunded within 30 days after a student's graduation or upon withdrawal from one of the residences, provided the student has given written notice to the Office of the Dean of Men, the Dean of Women, or the Dean of Student Affairs of the School of Nursing by August 1 to cancel a reservation for the fall semester, and not later than January 15 for cancellation of a reservation for the spring semester.

Annual Fees and Expenses

Tuition	\$2,100.00
Room rent (see section below)	\$ 308.00 to \$540.00
Food (see pages 17-19)	\$ 575.00 to \$650.00
Books and supplies (estimated)	\$ 130.00

Additional charges will be made for student government dues, and for such extras as election of courses in golf or digital computation, the registration of a car and damages to University property caused by the student.

Miscellaneous expenses depend upon the tastes and habits of the individual. Travel costs, clothing purchases, and other major expenditures should be added to this estimate.

The inclusive fee due each semester is payable to the Bursar upon receipt of the University's statement but in every case not later than the day of registration. Information about insured tuition payment plans acceptable to the University may be obtained from the Office of the Bursar.

After the day of registration no refund of tuition or room rent will be made. If a student on a board contract withdraws during the first six weeks of a semester, a board refund is made on a pro rata basis.

Housing

The Woman's College. Room rent in The Woman's College dormitories is \$518.00 per year for a single room and \$388.00 per year for a double room.

Trinity College and The School of Engineering. Charges for a year's rental in non-air-conditioned dormitories in Kilgo, Craven, Crowell, Few, and Wannamaker Quadrangles are as follows: for a single room, \$480.00; for occupancy in a double room, \$362.00; and for occupancy in a triple room, \$308.00. In the new residence halls and in other air-conditioned dormitories, charges for a year's rental are: for a single room, \$540.00; and for occupancy in a double room, \$404.00 per year.

School of Nursing. Room rent in Hanes House is \$518.00 per year for a single room and \$388.00 per year for a double room. Room rent in Hanes Annex is \$470.00 per year for a single room and \$355.00 per year for a double room.

Food Services

See the explanation of dining arrangements and food costs on pages 17-19 in the chapter on Residential Accommodations and Regulations.

Unpaid Bills

Until a student has settled with the Bursar for all indebtedness, his or her records are not released nor is the student considered a candidate for continuation or graduation.

The Bursar sends bills directly to the student unless requested in writing that they be sent to the student's parents or guardians.

Financial Aid, Loans, Grants, and Scholarships

Loans, grants-in-aid, and scholarships are available to entering freshmen and to continuing students. Entering freshmen apply through the Office of Undergraduate Admissions (see section on Student Aid in the *Bulletin of Undergraduate Instruction*).

Application for renewal of financial aid should be made to the Office of Undergraduate Financial Aid, 614 W. Campus Drive (Annex). Applications for scholarships administered by The Woman's College to upperclass students must be submitted to the Office of the Dean of The Woman's College by March 1 prior to the year of the award.

In case of financial emergency, students should consult with the dean of the appropriate school or college or the Director of Undergraduate Financial Aid.

Appendix A

Judicial Structure of Duke University

Article I: The Judicial System

- 1.010 The judicial system of the University shall consist of the University Judicial Board, a Judicial Board for each of the communities hereafter defined (see Article III), and a Judicial Board for each of the residential units in the University.

Article II: The University Judicial Board

2.010 *Jurisdiction*

a. The jurisdiction of the University Judicial Board shall be limited to cases arising out of the Pickets and Protests Regulations and cases involving more than one of the communities as determined by the Assistant Provost and Dean of Student Affairs in consultation with the Chancellor and the Chairman of the University Judicial Board.

b. The University Judicial Board shall have jurisdiction over members of the student body, members of the faculty, and administrative personnel of the University not subject to the Personnel Policy Handbook.

2.015 *Filing of Charges; Responsibilities of Assistant Provost and Dean of Student Affairs*

a. The Office of the Assistant Provost and Dean of Student Affairs shall have responsibility for receiving complaints, conducting investigations, and preferring charges concerning offenses within the jurisdiction of the Board. The University Judicial Board shall hear no case without a finding of probable cause made by the Assistant Provost and Dean of Student Affairs, whose signature to the charge or charges shall constitute sufficient evidence of such finding.

b. To assist the Assistant Provost and Dean of Student Affairs in the investigation of complaints, the gathering of evidence and the preparation of charges, investigative and judicial aides may be

appointed by the Dean and shall serve at his pleasure and under his direction. The number and specific duties of such aides shall be determined by the Dean, who shall be fully responsible for all duties performed by them in their capacity as aides.

c. The Assistant Provost and Dean of Student Affairs shall subpoena witnesses as directed by the University Judicial Board.

d. The Assistant Provost and Dean of Student Affairs may delegate all or any portion of his duties as regards these judicial procedures to an aide or aides whose appointment is approved by the Vice Provost and Dean of Undergraduate Instruction. The Assistant Provost and Dean of Student Affairs shall be responsible for the discharge of all duties thus delegated.

2.020 *Membership*

The University Judicial Board shall consist of a Chairman appointed by the Chancellor, five faculty members (two of whom shall be from the Law School) appointed by the Executive Committee of the Academic Council, and two student members from each of the communities (except in the case of the undergraduate community where there should be four members) elected by each community's Judicial Board. The Chairman of the Board shall select five-man panels consisting of a Chairman and an equal number of students and faculty. Cases referred to the Board shall be assigned to the panels in rotation, provided that a member of a panel may, at his request, be excused from sitting on a case by the Chairman of the Board, who may appoint a substitute from among the other members of the Board. Each panel shall be known as a "Hearing Committee of the University Judicial Board."

2.030 *Terms of Members*

Faculty members shall normally serve for two-year terms, but are eligible for reappointment. The terms should be staggered in order to provide continuity. Two of the initial appointees shall be appointed for one-year terms. Student members shall serve for one-year terms, although they may be eligible for re-election. The Board has the right to remove any member of the Board for cause by a vote of a two-thirds majority of all members. The vacancy shall be filled promptly according to the original procedure.

2.040 *Conduct of the Hearing*

a. The Hearing will be conducted in private unless the Accused requests an open hearing. If any objection is raised to conducting an open hearing in any particular case, the Hearing Committee of the University Judicial Board will decide the issue by majority vote. If the decision is made not to hold an open hearing, the Accused shall be informed in writing of the reasons for the decision.

b. The University and the Accused may each be represented by an adviser of his choice.

c. The Board shall promulgate its own rules of procedure consistent with academic due process and all provisions of this document.

d. The Accused has the right to challenge on the grounds of prejudice any member of the Hearing Committee sitting on his case. If an Accused makes such a challenge, the Hearing Committee shall deliberate in private to determine whether cause exists. By a majority vote of the members of the tribunal (excluding the member being challenged), a member shall be removed from the case and replaced by a member of the Board designated by the Chairman of the Judicial Board. In addition, the Accused may exercise a challenge directed at the entire panel, in which case the challenge shall be made to the Chairman of the University Judicial Board, who shall excuse the panel challenged and refer the Accused's case to the next panel in rotation.

2.050 *The Right of Appeal*

a. In cases heard by the University Judicial Board, there will be no appeal when the accused is acquitted.

b. A student or administrator who is not a member of the faculty convicted by the University Judicial Board may appeal to the President, or in his absence, the Provost, in which case such appeal shall be solely on the record of the proceedings before the Hearing Committee. Argument or appeal shall be on written submission, but the President may, in addition, require oral argument.

c. A member of the faculty convicted by the University Judicial Board may appeal to the Faculty Hearing Committee authorized under the provisions for Academic Freedom and Tenure of Duke University.

2.060 *Status of the Accused*

Charges must be prepared without delay following the alleged commission of the offense. Pending final verdict on charges against the Accused (including appeal), his status shall not be changed, nor his right to be on campus to attend classes suspended, except that the Chancellor or Provost may impose an interim suspension upon any member of the University community who demonstrates, by his conduct, that his continued presence on the campus constitutes an immediate threat to the physical well-being or property of the members of the University community or the property or the orderly functioning of the University. The imposition of interim suspension requires that the suspended individual shall immediately observe any restriction placed upon him by the terms of the suspension. The suspended

individual shall be entitled to a hearing within three days before the Hearing Committee on the formal charges. If he requires additional time to prepare his case before the Hearing Committee, he shall be entitled to an informal review of the decision imposing interim suspension by a three-man committee chosen from the members of the University Judicial Board by its Chairman. Interim suspension is an extraordinary remedy which will be invoked only in extreme cases where the interest of the University and members of its community require immediate action before the Hearing Committee can adjudicate formal charges against the suspended individual. If interim suspension is imposed and the accused is later found innocent, the University shall seek restitution as provided by the Hearing Committee with respect to the student's academic responsibilities incurred during the period of suspension.

2.070 *Civil and Criminal Courts*

Members of the University community may be subject to civil or criminal proceedings in a local court. The Chancellor may initiate legal action seeking injunctive or other civil relief, or file criminal charges when it is necessary to protect the person or property of members of the University community, or the orderly functioning or property of the University. Such action may be in addition to the filing of formal charges before the University Judicial Board and/or interim suspension.

2.080 *Sanctions*

a. A Hearing Committee of the University Judicial Board shall have the power to impose the following penalties upon students:

1. Expulsion. Dismissal from the University with the recommendation that the person never be readmitted.

2. Suspension. Dismissal from the University and from participation in all University activities for a specified period of time after which the student may apply for readmission.

3. Suspended suspension. Penalty (2), suspended because of unusual mitigating circumstances. In a period of time specified, conviction before the University Judicial Board, or before one of the community Judicial Boards may result in suspension.

4. Disciplinary probation. Placing a student on a probationary status for a specified period of time, during which conviction for violation of any regulation may result in more serious disciplinary action.

5. Exclusion from participation in extracurricular activities. Without limiting the generality of that penalty, such restrictions might involve participation in any collegiate athletics, or any public participation or performance in the name of the University. However, a Hearing Committee may not exclude a person from

performance of the duties of an elective office, but may make such a recommendation to the appropriate organization. This penalty may be imposed by itself or in addition to any of the other enumerated penalties.

6. Censure. Written reprimand for violation of the specified regulation, including the possibility of more severe disciplinary sanction in the event of conviction for the violation of the same or one of equal seriousness within the period of time stated by the reprimand.

7. Admonition. By an oral statement to the offender that he has violated the University rules or has been in contempt of the Board.

8. Restitution. Payment for all, or a portion of property damage caused during the commission of an offense. This penalty may be imposed by itself, or in addition to any of the other penalties.

9. Fines. Payment of reasonable sums to be determined by a Hearing Committee. This penalty may be imposed by itself, or in addition to any of the other penalties.

10. Exclusion from social activities where the nature of the violation so indicates including, but not limited to, curfews or other revocation of upper class privileges.

b. A Hearing Committee of the University Judicial Board shall have the power to impose the following penalties upon faculty members and administrative personnel not subject to the provisions of the Personnel Policy Handbook.

1. Dismissal. Dismissal or termination of appointment.
2. Censure.
3. Admonition.
4. Restitution.
5. Fines.

2.085 *Other Powers*

The Hearing Committee may recommend to the University that it seek restitution with respect to the Accused's University responsibilities incurred during a period of suspension or during the period when a hearing has been conducted or shall make such other non-punitive recommendations with respect to the Accused as it shall deem appropriate.

2.090 *Records*

The Board shall promptly arrange a policy of keeping its own records, subject to the University policy on confidentiality.

2.095 *Excusal of Members of the University Community from University Obligations*

Any member of the University community whose presence is required at a hearing shall be excused from the performance of

any University responsibilities which would normally be performed at the time when his presence is required before the Hearing Committee.

2.096 *Revocation of Probation or Suspended Suspension*

In the event that a student has been placed on suspended suspension or disciplinary probation by the University Judicial Board and subsequently is convicted of a violation of a regulation by any other University tribunal, the suspension of his suspension or the revocation of his probation will not automatically occur. In such a case he shall be entitled to a hearing before a panel of the University Judicial Board, said hearing being limited to the issue of whether his probation should be revoked or whether he should be suspended as the result of his original conviction and the conduct which gave rise to his second conviction.

Article III: Community Judicial Boards

3.010 *Community Judicial Boards*

There shall be an Undergraduate Community consisting of the undergraduates in the School of Nursing, The Woman's College, the School of Engineering, and Trinity College; a Divinity School Community consisting of all students in the School of Divinity; a Law School Community consisting of all students in the School of Law; a Medical School Community consisting of all students in the School of Medicine and students in the para-medical non-degree programs; a Forestry School Community consisting of all students in the School of Forestry; and a Graduate School Community consisting of all students in the Graduate School. Except as hereafter provided for the Undergraduate Community, each Community shall have such judicial system as its governing body may provide consistent with this enactment.

Article IV: The Undergraduate Community

4.010 *The Undergraduate Judicial Board*

This Board shall have fifteen members. Six will be students. Consideration shall be given to the appointment of at least one student from each of the undergraduate colleges and schools. There shall be at least one member from each campus. The remaining members of the Board shall be six faculty members and three deans.

a. *Selection of Members.* The faculty members shall be appointed by the Committee on Committees of the Undergraduate Faculty Council. The deans shall be appointed by the Vice-Provost and Dean of Undergraduate Education. Appointees shall be deans in the undergraduate schools and colleges, but shall not include the Dean of Men and his assistants in Trinity College, the Dean of Women and her assistants in The Woman's College,

and the Dean of Student Affairs and her assistants in the School of Nursing. For the year beginning September, 1969, the student members of the Board shall be elected by the members of the present Judicial Boards of the School of Nursing, Woman's College, the School of Engineering, and Trinity College. Members might sit collectively and all decisions shall be reached by majority vote. In succeeding years, the student members of the Undergraduate Judicial Board shall be chosen with the senior undergraduate members making nominations, if there are at least two senior undergraduate members. Nominations shall always exceed the number of prospective vacancies. The chief executive officer of the undergraduate student government, with the advice and consent of the undergraduate legislative body, shall then appoint members to fill the vacancies from those nominated. In the absence of at least two senior members the chief executive officer of the undergraduate student government, with advice and consent of the undergraduate legislative body, shall appoint the members. Interim vacancies may be filled by the concurring vote of ten members of the Board.

b. Terms of Members. Student members of the Board shall serve for one year and will be eligible for reappointment so long as they remain undergraduates. Faculty members and deans shall normally serve three-year terms. In order to establish staggered terms, however, for the first Judicial Board, two faculty members and one dean shall be appointed for one-year terms, two faculty members and one dean for two-year terms, and two faculty members and one dean for three-year terms. The Board has the power to remove any of its members for cause by a two-thirds majority of all members. The vacancy shall be filled promptly by the concurring vote of ten members of the Board.

c. Organization of the Board. The Boards shall elect a Chairman and a Vice-Chairman who shall be students. When present at any meeting of the Board or at any hearing the Chairman shall preside. When he is not present his duties shall be performed by the Vice-Chairman. The presiding officer shall appoint a secretary and see to it that full minutes of all actions of the Board are kept in a permanent record book.

d. Organization of Hearing Committees. The Chairman, or in his absence the Vice-Chairman, shall select five-man panels consisting of a Chairman and four members including one Dean and at least one member of the faculty. Cases referred to the Board shall be assigned to the panels in rotation, provided that a member of a panel may, at his request, be excused from sitting on a case by the Chairman, who may appoint a substitute from the other members of the Board. Each panel shall be known as a "Hearing

Committee of the Undergraduate Judicial Board.” In highly specialized cases involving professional questions, the Accused may request, and the Chairman of the Board in consultation with the appropriate dean may appoint, a special master to advise the Hearing Committee.

e. Jurisdiction. The Undergraduate Judicial Board shall adjudicate originally all cases in which the Accused is a student* in the Undergraduate Community, which are not within the jurisdiction of the University Judicial Board, and which might result in a penalty of disciplinary probation or greater. It shall also hear any case involving two or more undergraduates not all of whom normally would be subject to the jurisdiction of the same residence hall judicial board.

f. Role of the Assistant Provost and Dean of Student Affairs.

1. The Office of the Assistant Provost and Dean of Student Affairs shall have responsibility for receiving complaints, conducting investigations, and preferring charges concerning offenses within the jurisdiction of the Board. The Undergraduate Judicial Board shall hear no case without such a finding of probable cause by the Assistant Provost and Dean of Student Affairs, whose signature to the charge or charges shall constitute sufficient evidence of such finding.

2. To assist the Assistant Provost and Dean of Student Affairs in the investigation of complaints, the gathering of evidence, and the preparation of charges, Investigative and Judicial Aides may be appointed by the Dean and shall serve at his pleasure and under his exclusive direction. The number and specific duties of such Aides shall be determined by the Dean, who shall be fully responsible for all duties performed by them in their capacity as Aides.

3. The Assistant Provost and Dean of Student Affairs shall prepare a Weekly Report, which shall list all complaints received and describe any action taken on them. These Reports shall be available to the Chairman of the University Judicial Board, the Chairman of the Community Judicial Boards, and deans authorized to receive such reports.

4. The Assistant Provost and Dean of Student Affairs shall train a staff of advisers as directed by the Judicial Boards.

5. The Assistant Provost and Dean of the Student Affairs may delegate all or any portion of his duties as regards these judicial procedures to an Aide or Aides whose appointment is approved by the Vice Provost and Dean of Undergraduate Education. The

* A person will be considered a student if he is currently enrolled in the undergraduate colleges including those who are also employees, and also including former students or prospective students to the extent of being able to plan provisional holds on admission or readmission.

Assistant Provost and Dean of Student Affairs, however, shall be responsible for the discharge of all duties thus delegated.

g. Conduct of Investigation or Preferral of Charges. Upon receiving a complaint, the Assistant Provost and Dean of Student Affairs shall do the following:

1. In conducting his investigation, he shall promptly assemble and examine all evidence either material or relevant to the allegation. This investigation might include, but shall not be limited to the following: Holding an informal preliminary hearing of testimony; interviewing the accused; interviewing any holder of evidence; gathering documents and records. Before the Dean or his representative asks any questions of an accused, he shall inform him of his right to remain silent, and his right to an adviser as defined herein.

2. Determine promptly on the basis of the preliminary investigation whether or not there is probable cause for believing that the accused person committed the alleged act. If the Dean or his representative does not find probable cause, no further action shall be taken on the matter other than reporting this finding in a Weekly Report. (See f3.) If he finds that a case in which there is probable cause is not within the province of the Undergraduate Judicial Board, he shall refer it to the appropriate Judicial Board.

3. Examine University and Community regulations to determine whether or not the commission of the alleged act might be held to violate any of said regulations. If the dean or his representative does not find a violation, no further action shall be taken on the matter other than reporting the finding in the Weekly Report.

4. If he finds probable cause and concludes that there has been a violation, immediately draw up a charge sheet. The charge sheet shall include at least the following information: A brief description of the alleged act, the regulation which the act violates, the date, and the signature of the dean or his elected representative.

5. Prepare a written report of his findings and transmit that report to the appropriate tribunal. This report shall contain a copy of the charge sheet, all evidence gathered in the preliminary investigation, with its sources, and any evidence gathered in subsequent investigations, with its sources. Nowhere in this report shall a personal opinion be expressed as to the merits of a piece of evidence, or as to the guilt or innocence of the Accused; however, where there are conflicts in the evidence, the Dean shall draw the attention of the Judicial Board to them. The report shall become a part of the written record of the hearing. If a majority of the Judicial Board receiving this report from the Dean or his repre-

sentative believe that their Board does not have jurisdiction over the case in question, the case shall be postponed and the Chairman of the Board shall refer the matter to the Chairman of the University Judicial Board who shall appoint a three-man subcommittee of the University Judicial Board who shall determine the question of jurisdiction. Its decision shall be final.

6. Subpoena witnesses as directed by the Judicial Board.

h. Procedural Safeguards

1. The hearing of all charges shall take place promptly, ordinarily within ten days following the presentation of the charges to the Accused. The Accused shall be given notice to appear, written notices of the charges against him, and a written text of the regulations which he is accused of violating, the report of the Dean prepared pursuant to section 4.010(g)(5), a statement of his procedural rights, and any other material that the Judicial Board instructs the Dean to supply to him at least 72 hours before the hearing. If he desires additional time in which to prepare his defense, he may petition the Chairman of the Board and be granted a reasonable delay of the hearing. The Accused may waive the notice and the 72-hour notification period.

2. No person presenting evidence against the Accused shall at any time sit in judgment upon him.

3. The Accused has the right to challenge on the grounds of prejudice any member of the Hearing Committee sitting on his case. If an Accused makes such a challenge, the Hearing Committee shall deliberate in private to determine whether cause exists. By a majority vote of the members of the tribunal (excluding the member being challenged), a member shall be removed from the case, and replaced by a member of the Board designated by the Chairman of the Judicial Board. In addition, the Accused may exercise a challenge directed at the entire panel, in which case the challenge shall be made to the Chairman of the Undergraduate Judicial Board, who shall excuse the panel challenged and refer the Accused's case to the next panel in rotation.

4. The Accused may choose an adviser from the University community to assist him in his defense. The adviser may not be a member of the Undergraduate Judicial Board.

5. The Accused has the right and should be advised of his right to produce witnesses (including no more than two character witnesses), introduce documents, and offer testimony in his own behalf. He, but not his adviser, may question all witnesses. An Accused, with the assistance of an adviser, may submit questions in writing to the Chairman. The Chairman shall ask such questions submitted to him if they are fair and relevant. A copy of the questions shall be appended to the record.

6. A person having direct knowledge relevant to a case being heard by the Board is a material witness. The Assistant Provost and Dean of Student Affairs may require the appearance of material witnesses. He shall notify them of the time, place, and purpose of their appearance. He shall also require, upon written request of the complainant or the Accused, the appearance of material witnesses. He shall notify such witnesses of the time, place and purpose of their appearance.*

7. The Accused has the right to examine the written statement of any witness relevant to his case at least 72 hours before the hearing. He has the right to be faced by any witness who has given a statement relevant to his case at the hearing if the witness' attendance can be secured.

8. The hearing will be conducted in private unless the Accused requests an open hearing. If any objection is raised to conducting an open hearing in any particular case, the Hearing Committee shall decide the issue by majority vote. If the decision is made not to hold an open hearing, the Accused shall be informed in writing of the reasons for the decision.

9. The Hearing Committee shall consider only the report of the Dean, documents submitted into evidence, and the testimony of witnesses at the hearing in reaching its decisions.

10. Any student whose presence is required at a hearing before the Undergraduate Judicial Board shall be excused from performance of any University responsibility which would normally be performed at the time when his presence is required before the Hearing Committee.

i. Conduct of the Hearing.

1. Except as hereafter provided, the hearing of any case shall begin with a reading of the charge by the Chairman in the presence of the Accused. The Accused shall then plead guilty or not guilty or move to terminate or postpone the hearing. The Accused may qualify a plea, admitting guilt in part and denying it in other part.

2. The Accused has the right to remain silent in regard to the charges brought against him, before, during and after the hearing. No inference of guilt shall be made from his silence. Any information pertinent to the charges volunteered by the Accused may be used as evidence against him. If he elects to offer testimony as to a specific act of misconduct, he then waives his right to remain silent as to this specific act, and must answer truthfully all questions pertaining to it asked of him.

3. The Chairman of the Hearing Committee shall call for a

* The Committee on Judicial Procedures recommends that failure to appear as a material witness be made a violation of judicial codes.

reading of the report from the Dean concerning the case. The Hearing Committee shall request the Accused to present his case. The Accused may call and question witnesses. The Committee may call and question witnesses to clarify matters which have been the subject of testimony. It should not attempt to act as a prosecutor or as a defense counsel.

4. All evidence which the Committee considers relevant shall be admitted except as hereafter provided. Specifically, the fact that evidence offered is hearsay or an expression of opinion will not in itself bar the admission of the evidence. Written statements may be admitted but wherever possible oral testimony rather than any written statement should be employed. No one shall be convicted solely on the declaration of one whom the Accused has had no opportunity to examine. No evidence obtained through unlawful search and seizure or in violation of the University's *Statement on the Privacy of Students' Rooms* shall be admissible at the hearing.

5. The Accused may not be questioned for more than one hour without recess.

6. Pending verdict on charges (including appeal) against the Accused, his status as a student shall not be changed, nor his right to be on campus or to attend classes suspended, except that the Chancellor or Provost may impose an interim suspension upon any member of the University community who demonstrates, by his conduct, that his continued presence on the campus constitutes an immediate threat to the physical well-being or property of members of the University community or the property or orderly functioning of the University. The imposition of interim suspension requires that the suspended individual shall immediately observe any restriction placed upon him by the terms of the suspension. The suspended individual shall be entitled to a hearing within three days before the Hearing Committee on the formal charges. If he requires additional time to prepare his case before the Hearing Committee, he shall be entitled to an informal review of the decision imposing interim suspension by a three-man committee chosen from the members of the Undergraduate Judicial Board by its Chairman. Interim suspension is an extraordinary remedy which will be invoked only in extreme cases where the interests of the University and members of its community require immediate action before the Hearing Committee can adjudicate formal charges against the suspended individual. If interim suspension is imposed and the Accused is later found innocent, the University shall grant restitution as provided by the Undergraduate Judicial Board with respect to that student's academic responsibilities incurred during the period of suspension.

7. A tape recording and a digest shall be kept of the initial hearing. The basis for the decision shall be summarized clearly in brief, numbered paragraphs. Any dissenting opinions shall be similarly explained. Tapes should be clearly labeled, and not more than one case should be recorded on any tape.

j. Sanctions. The Undergraduate Judicial Board shall have the power to impose the following penalties:

1. Expulsion. Dismissal from the University with the recommendation that the person never be readmitted.

2. Suspension. Dismissal from the University and from participation in all University activities for a specified period of time, after which the student may apply for readmission.

3. Suspended Suspension. Penalty (2), suspended because of unusual mitigating circumstances. During the period of time specified, conviction before the University Judicial Board, or before one of the Community Judicial Boards, may result in suspension.

4. Disciplinary Probation. Placing the student on a probationary status for a specified period of time, during which conviction for violation of any regulation may result in more serious disciplinary action.

5. Exclusion from participation in extracurricular activities. Without limiting the generality of that penalty, such restrictions might involve participation in intercollegiate athletics, or any public participation or performance in the name of the University. However, a hearing committee may not exclude a person from performance of the duties of an elective office, but may make such a recommendation to the appropriate organization. This penalty may be imposed by itself, or in addition to any of the other enumerated penalties.

6. Censure. Written reprimand for violation of a specified regulation, including the possibility of more severe disciplinary sanction in the event of conviction for the violation of the same or one of equal seriousness within a period of time stated in the letter of reprimand.

7. Admonition. An oral statement to the student offender that he has violated University rules or has been in contempt of the Board.

8. Restitution. Payment for all, or a portion of property damage caused during the commission of an offense. This penalty may be imposed by itself, or in addition to any of the other penalties.

9. Fines. Payment of reasonable sums to be determined by the Board. This penalty may be imposed by itself, or in addition to any of the other penalties.

10. Exclusion from social activities where the nature of the violation so indicates including, but not limited to, curfews or revocations of upper class privileges.

k. The Verdict.

1. After hearing the evidence and summations offered by the parties, the Hearing Committee shall consider its verdict and judgment in closed session. The verdict shall consist of a simple statement of the significant acts done or not done by the Accused. If the Hearing Committee is unable to say that there is clear and convincing evidence that an act was done, then the Hearing Committee shall conclude that the act was not done. A similar rule shall govern in the case of a failure to act. The judgment shall consist of a finding of guilty or not guilty of the charge and, when the Accused is found guilty, a statement of the punishment assessed. Any judgment of suspension or expulsion must be concurred in by at least four concurring votes of the five-member hearing committee. On other questions, including the verdict and the finding of guilty or not guilty, the Hearing Committee shall be governed by a majority vote.

2. A hearing committee by a majority vote may decide to rehear a case in which significant new evidence can be introduced in behalf of the Accused.

3. The Chairman of the Judicial Board shall promptly inform in writing the defendant and the appropriate administrative officer of the decision. The Chairman shall at the same time inform the defendant of his rights of appeal.

l. Alternate to the Hearing by the Undergraduate Judicial Board. An accused may request that his or her case be heard by the appropriate Dean of his or her college or school, who may refuse to hear it. If the Dean decides to hear the case, he is bound by the same procedures followed by the Undergraduate Judicial Board. The Dean shall have the authority to give any of the penalties specified in the code.

m. Right of Appeal.

1. Where the penalty assessed by either the Undergraduate Judicial Board or a Dean acting instead of the Undergraduate Judicial Board is greater in severity than suspended suspension, the Accused shall have a right of appeal to the Vice Provost and Dean of Undergraduate Education.

2. An appeal shall be made on the following grounds only:

(a) Procedural error substantially affecting the rights of the Accused.

(b) Incompatibility of the verdict with the evidence.

(c) Excessive penalty not in accord with "current community standards."

(d) New evidence of a character directly to affect the verdict but on which the original tribunal had refused a new hearing.

(e) Error in applying or interpreting the rule under which the case was originally tried.

3. In no case shall an appeal from the Undergraduate Judicial Board result in a *de novo* hearing of testimony of other evidence. However: (a) The documents transmitted by the original tribunals shall include the tapes of the testimony taken at the hearing. The Accused may, at his own expense, have a transcription of the tape made.

(b) The original tribunals shall provide for the Dean written opinions, containing the reasoning upon which the majorities based their decision and any dissenting opinions of members thereof.

(c) The defendant shall submit to the Vice Provost and Dean of Undergraduate Education a written statement containing the ground(s) for his appeal and his arguments.

(d) The defendant shall be allowed to make an oral statement to the Dean to amplify his written arguments. The Dean may question the defendant at this time about his oral statement or his written statement, but shall confine himself to the issues on appeal. These additional statements and arguments shall be recorded.

(e) The Vice Provost and Dean of Undergraduate Education may call a representative of the original tribunal to answer questions concerning written opinions submitted in accordance with paragraph *b* of this section. This material shall likewise be incorporated in the record.

(f) In cases where the Dean acquits the Accused, changes the penalty, or directs the original tribunal to conduct a new hearing, he shall submit to the original tribunal a detailed written opinion as to his reasoning. This opinion would be similar to that prescribed in paragraph *b* of this section.

4. Decisions of the Vice Provost and Dean of Undergraduate Education shall be promptly communicated to the appropriate dean of the college of the Accused and forthwith to the applicant with a copy to the original tribunal.

5. The term Vice Provost and Dean of Undergraduate Education shall include not only the person appointed to the office but also any other person or persons appointed to perform the functions of the office. With the consent of the Accused, the Vice Provost and Dean of Undergraduate Education shall be authorized to consult with such member of the University community as he chooses concerning the disposition of the appeal.

n. *Other Powers.* The Hearing Committee may recommend to the University that it seek restitution with respect to the Accused's University responsibilities incurred during a period of suspension or during the period when a hearing has been conducted or shall make such other non-punitive recommendations with respect to the Accused as it shall deem appropriate.

4.015 *Revocation of Probation and Suspended Suspension*

In the event that a student has been placed on suspended suspension or disciplinary probation by the Undergraduate Judicial Board and subsequently is convicted of a violation of a regulation by any other University tribunal, the suspension of his suspension or the revocation of his probation will not automatically occur. In such a case he shall be entitled to a hearing before a panel of the Undergraduate Judicial Board, said hearing being limited to the issue of whether his probation should be revoked or whether he should be suspended as the result of his original conviction and the conduct which gave rise to his second conviction.

4.020. *Judicial Boards for Residential Units*

The appropriate campus community council shall define the residential units within its jurisdiction. Each residential unit shall, on majority vote of its residents certified to the Assistant Provost and Dean of Student Affairs, have a Residential Unit Judicial Board constituted as the majority of residents deem appropriate. Such Judicial Boards shall have jurisdiction of all offenses when the punishment can in no circumstances exceed censure (see 4.010 [j] [6-10]). These Judicial Boards shall impose only those sanctions previously authorized by the appropriate campus community council. They shall also have jurisdiction of all cases referred to them by the Assistant Provost and Dean of Student Affairs or his representative. In such cases the Board shall impose no greater punishment than censure. Rules of procedure shall be prescribed by the respective Boards. The Boards shall make provision for an Accused to be assisted by a student adviser of his choice, for an Accused to have full notice of the charges against him and a fair opportunity, by presenting evidence or otherwise, to disprove the charges.

(a) In case a Residential Unit does not have a Judicial Board, judicial action will be taken by the appropriate Dean.

(b) In the event that a student has no residential affiliation, judicial action will be taken by the appropriate Dean.

(c) An Accused may request that his or her case be heard by the appropriate Dean of his or her college or school, who may refuse to hear it. If the Dean decides to hear the case, he is bound by the same procedures followed by the Undergraduate

Judicial Board. The Dean shall have the authority to impose any of the penalties specified in the relevant code.

(d) Appeal from judgments of Residential Unit Judicial Boards shall be to the appropriate Dean of the college or school of the Accused.

(e) Records of Cases Tried by Residential Judicial Boards: Records of all cases tried by Residential Judicial Boards shall be maintained subject to the University's policy governing confidential disclosures.

Article V: Amendment and Construction

5.010 Amendment

The judicial procedures of Duke University may be amended at any time by the Chancellor according to procedures to be worked out by student organizations, faculty, and administrative representatives, but such amendments shall be effective only after due notice or publication.

5.020 Construction

All questions not covered by the foregoing articles may be resolved by using existing institutions (i.e., the Traffic Commission, etc.) or by amendment.

Appendix B

Community Council of the Woman's College

Constitution

- I. The purpose of the Community Council of The Woman's College (CCWC) is to act on matters which are of concern to the Woman's College community.
- II. Powers.
Proposals passed by the CCWC shall be forwarded to the Dean of the Woman's College for her written approval or veto. This answer shall come within fifteen days. If a proposal is vetoed, the decision may be appealed to the Provost upon two-thirds vote of the Council.
- III. Membership.
The membership of the CCWC shall consist of representatives of the University concerned with the Woman's College community. Therefore, it shall include three faculty, two house counselors, three administrators, and five students.
- IV. Chairman.
The Chairman shall be elected from the membership of the CCWC. He or she shall appoint a secretary from the membership and committee members as needed and provided by the bylaws. The Chairman or his designate shall call and preside over all meetings.
- V. Proposals may be brought to the Council from any member of the community served by the Council. The Council shall consider and acknowledge all proposals submitted.

Bylaws

Article I — Committees.

- Section 1. Standing Committees, composed of the members of CCWC and other members of the University community, may be established when deemed necessary by the Council. Stand-

ing committee members shall be appointed by the Chairman of the Council with the approval of the members of the Council.

Section 2. *Ad hoc* committees may also be established and their members appointed by the Council in a similar manner.

Article II — Elections and appointments shall be completed by the first week in October.

Section 1. Faculty—There shall be three faculty members, at least two of whom shall be associated with The Woman's College dormitories. The two faculty members associated with dormitories shall be appointed from a list of six nominees submitted by the WRC (Women's Residence Council). The third faculty member shall be appointed from lists supplied by the WRC and the administrative staff of The Woman's College. The appointments shall be made by the Chairman of the WRC and the Dean of The Woman's College, and the faculty members shall serve for one year.

Section 2. House Counselors—There shall be two house counselors elected by the group of house counselors.

Section 3. Administration—The three administrators shall be elected by the administrative staff of the Woman's College.

Section 4. Students—There shall be five student members. Two shall be elected at-large by the members of the AWR (Association of Women's Residences). One shall be a representative from the WRC, another shall be the ASDU vice-president. The fifth student member shall be the Chairman of the Woman's College Judicial Board or her designated representative.

Article III — There shall be at least three meetings each semester.

Article IV — Procedure in Meetings.

Section 1. Procedure in meetings not specified in the Constitution and Bylaws shall be governed by *Robert's Rules of Order*.

Section 2. Nine members, including at least one member of each representative group of the community, shall constitute a quorum for all meetings of the Council.

Section 3. A simple majority vote is sufficient for all questions on which the Constitution does not require a large proportion of votes unless the results represent block voting of student or non-student constituents.

Section 4. Meetings shall be open to the University community. The number of outside participants may be limited (but not to fewer than five) by vote of the Council. (Representatives of the Chronicle and WDBS will be given preference.) Outside participants may take part in the discussions but may not vote.

Article V — Amendments to the Bylaws.

The Bylaws may be amended by a two-thirds vote of the members of the Council. The proposed amendments must have been considered at a previous meeting of the Council before being brought to a vote.

Appendix C

West Campus Community Council Constitution

Definition. The West Campus Community Council (W.C.C.C.) is a body comprised of students, faculty, residential staff, and administration. Its purpose is to deliberate and recommend policy on matters of concern to the West Campus community.

Powers. Any recommendations or proposals voted by the W.C.C.C. shall be sent the Dean of Trinity College for written approval or disapproval. This should come within fifteen days of the submission of the Council's action to the Dean. If a proposal is disapproved, the decision may be appealed to the Provost upon two-thirds vote of the Council.

Membership. As the West Campus Community Council endeavors to represent all members of the University community who have a lively concern for the residential situation on the men's campus, it includes members of the faculty, administration, and residential staff, as well as students.

Faculty. Four members shall be chosen by the Committee on Committees of the Undergraduate Faculty Council from persons to be nominated as follows: the head of the Interfraternity Council shall nominate one or more faculty fellows associated with fraternity sections, one of whom shall be chosen; the head of the association of Independent Houses shall nominate one or more faculty fellows associated with independent living groups, one of whom shall be chosen; the President of the Freshman Class shall nominate one or more faculty fellows associated with freshman houses, one of whom shall be chosen. The Committee on Committees shall appoint an at-large representative from the Trinity College faculty fellows.

Administration. A dean in Trinity College, a dean or faculty member in the School of Engineering; the Dean of Freshmen, and the Dean of Undergraduate Men. The Dean of Trinity College shall be an *ex officio*, non-voting member of the Council.

Students. A.S.D.U. Vice President for West Campus; the Presi-

dent of the Freshman Class; the President of the Engineering Student Government; the President of the Interfraternity Council; the President of the Association of Independent Houses; the Chairman of the Men's Judicial Board; and a member at-large from the West Campus Student Body to be elected by the West Campus members of A.S.D.U. legislature. These men may, with the approval of the chairman of the Council, send a representative of their groups to serve their terms of office. Service on the Council will be for an entire academic year except for the President of the Freshman Class who shall remain on the Council until a new Freshman Class President is elected.

Residential Staff. The Supervisor of Men's Residences; a housemaster from a freshman dormitory; and a resident fellow from one of the independent houses. These men will be chosen before the first meeting of the academic year by the Supervisor of Men's Residences with the approval of the Dean of Men and, respectively, the president of the Freshman Class and the President of A.I.H. The appointment of the freshman housemaster will be on an interim basis until ratified by the new President of the Freshman Class, who has the option of recommending another housemaster to the Supervisor of Men's Residences. In the case of addition of resident fellows to fraternity sections, one of these residents, selected by the Supervisor of Men's Residences with the approval of the Dean of Men and the President of I.F.C. may be added to the Council.

Chairman. The Chairman shall be elected from the membership of the Council at the first meeting of the academic year. He will call meetings and preside over them, but will not vote except in the case of a tie. He has the authority to appoint subcommittees when he deems it necessary.

Written proposals may be brought to the Council from any member of the community served by the Council. The Council is obligated to consider all proposals submitted.

Procedure in Meetings. Procedure in meetings not specified by the Constitution shall be governed by *Robert's Rules of Order*.

Ten members, including at least one representative from each group represented on the Council (students, faculty, administration, residential staff) shall constitute a quorum for all meetings of the Council.

Unless specified in the Constitution, a simple majority is needed to carry a motion.

Meetings shall be open to the University community unless the Council decides by a two-thirds majority to close the meeting.

The West Campus Community Council may amend this Constitution with a two-third majority of the Council in favor of the amendment. The proposed amendment shall be brought to a vote on the meeting after it is presented to the Council.

Appendix D

Sections of the General Statutes of North Carolina Regarding the Possession and Use of Alcoholic Beverages

G.S. 18-90.1. Sale to or Purchase by Minors.

It shall be unlawful for:

1. Any person, firm, or corporation knowingly to sell or give any of the products described in G.S. 18-64 to any minors under 18 years of age.
2. Any minor under 18 years of age to purchase or possess, or for anyone to aid or abet such minor in purchasing any of the products described in G.S. 18-64.
3. Any person, firm, or corporation knowingly to sell or give any of the products described in G.S. 18-60 to any minor under 21 years of age.
4. Any minor under 21 years of age to purchase or possess, or for anyone to aid or abet such minor in purchasing any of the products described in G.S. 18-60.

G.S. 18-64. Definitions.

The term "beverages" as used in this article shall include:

1. Beer, lager beer, ale, porter, and other brewed or fermented beverages containing one-half of one percent (1%) of alcohol by volume but not more than five percent (5%) of alcohol by weight as authorized by the laws of the United States of America.
2. Unfortified wines, as used in this article, shall mean wine of an alcoholic content produced only by natural fermentation or by the addition of pure cane, beet, or dextrose sugar and having an alcoholic content of not less than five percent (5%) and not more than fourteen percent (14%) of absolute alcohol, the percentum of alcohol to be reckoned by volume, which wine has been approved as to identity, quality, and purity by the State Board of Alcoholic Control as provided in this chapter.

The term "person" used in this article shall mean any individual, firm,

partnership, association, corporation, or other groups or combination acting as a unit.

The term "sale" as used in this article shall include any transfer, trade, exchange or barter in any manner or by any means whatsoever, for a consideration.

G.S. 18-60. Definition of "Alcoholic Beverage"

The term "alcoholic beverage," as used in this article, is hereby defined to be and to mean alcoholic beverages of any and all kinds which shall contain more than fourteen percent of alcohol by volume, and this article is not intended to apply to, or regulate, the possession, sale, manufacture or transportation of beer, wines or ales containing a lower alcoholic content than above specified, and whenever the term "alcoholic beverages" is used in this article, it shall be construed as defined in this section.

Appendix E

Statutes of North Carolina Pertaining to the Possession and Use of Certain Drugs

Narcotic Drugs

Under the provisions of G.S. 90-87 (General Statutes of North Carolina) (1)d. marijuana is defined as a narcotic drug.

G.S. 90-97 (9) further defines narcotic drugs: "Narcotic drugs" means coco (coca) leaves, opium, cannabis, peyote, mescaline, psilocybe maxima, psilocybin, lysergic acid diethylamide, or other psychedelic drugs or hallucinogens, or any derivatives of any of these which possess hallucinogenic properties, and every other substance neither chemically nor physically distinguishable from them; and other drugs to which the federal narcotic laws may now apply; and any drug found by the State Board of Health after reasonable notice and opportunity for hearing, to have an addiction-forming or addiction-sustaining liability similar to morphine or cocaine, from the effective date of determination of such finding by said State Board of Health.

G.S. 90-88 provides that "it shall be unlawful for any person to manufacture, possess, have under his control, sell, prescribe, administer, dispense, or compound any narcotic drug except as authorized in this article." (The authorization referred to is with respect to licensed druggists, pharmacists, physicians, and others, who can legally possess and dispense narcotic drugs.)

G.S. 90-111. *Penalties for Violation.* (a) Any person violating any provision of this article or any person who conspires, aids, abets, or procures others to do such acts shall upon conviction be punished, for the first offense, by a fine of not more than one thousand dollars (\$1,000.00) or be imprisoned in the penitentiary for not more than five years, or both, in the discretion of the court. For a second violation of this article, or where in case of a first conviction of violation of this article, the defendant shall previously have been convicted of a violation of any law of the United States, or of this or any other state, territory, or district, relating to the sale or use or possession of narcotic drugs or marijuana, and such

violation would have been punishable in this State if the offending act had been committed in this State, the defendant shall be fined not more than two thousand dollars (\$2,000.00) and be imprisoned not less than five nor more than ten years. For a third or subsequent violation of this article, or where the defendant shall previously have been convicted two or more times in the aggregate of a violation of any law of the United States, or of this or any other state, territory, or district relating to the sale, use or possession of narcotic drugs or marijuana, and such violation would have been punishable in this State, the defendant shall be fined not more than three thousand dollars (\$3,000.00) and be imprisoned in the penitentiary not less than fifteen (15) years nor more than life imprisonment.

(b) Upon conviction for a second or subsequent offense the sentence provided by this section shall not be suspended and probation shall not be granted unless the presiding judge shall find that the violation for which the defendant was convicted did not consist of peddling, selling, bartering, or otherwise distributing narcotics to others in violation of this article, or the possession of narcotics for the purpose of peddling, selling, bartering, or otherwise distributing narcotics to others in violation of this article. For the purpose of making the finding provided in this subsection before a sentence may be suspended, the defendant shall have the burden of proving that the violation for which he was convicted did not consist of peddling, selling, bartering, or otherwise distributing narcotics to others in violation of this article or the possession of narcotics for the purpose of peddling, selling, bartering, or otherwise distributing narcotics to others in violation of this article. The charge contained in the warrant or bill of indictment shall not be considered in making such finding for the purpose of suspending the sentence.

(c) If the offense shall consist of the sale, barter, peddling, exchange, dispensing or supplying of marijuana or a narcotic drug to a minor by an adult in violation of any provision of this article, such person shall upon conviction be punished by a term of not less than ten years nor more than life imprisonment and shall be fined not more than three thousand dollars (\$3,000.00) for the first and all subsequent violations of this article, and the imposition or execution of sentence shall not be suspended, and probation shall not be granted.

Barbiturate and Stimulant Drugs

Under the provisions of G.S. 90-113.1, the term "barbiturate drug" means: (a) Barbituric acid, the salts and derivatives of barbituric acid, or compounds, preparations, or mixtures thereof; and (b) Drugs, compounds, preparations, or mixtures which have a hypnotic or somnifacient effect on the body of a human or animal, to be found by the State Board of Pharmacy and duly promulgated by rule or regulation; except that the term "barbiturate drug" shall not include any drug the manufacture or delivery of which is regulated by the narcotic drug laws of this State:

Provided, however, that the term "barbiturate drug" shall not include compounds, mixtures, or preparations containing barbituric acid, salts or derivatives of barbituric acid, when such compounds, mixtures, or preparations contain a sufficient quantity of another drug or drugs, in addition to such acid, salts, or derivatives, to cause the resultant product to produce an action other than its hypnotic or somnifacient action.

G.S. 90-113.1 defines "stimulant drugs": The term "stimulant drugs" means any drugs consisting of amphetamine, desoxyephedrine (methamphetamine), mephentermine, pipradol, phenmetrazine, methylphenidate or any salt, mixture, or optical isomer of any of them, which drug, salt, mixture, or optical isomer has a stimulating effect on the central nervous system, but shall not include preparations containing any of the aforementioned drugs, salts, mixtures, or optical isomers thereof which is compounded, mixed or prepared with another drug so as to cause the resultant product to produce an action other than that of predominantly stimulating the central nervous system.

G.S. 90-113.1 further defines the phrase "Glue containing a solvent having the property of releasing toxic vapors or fumes" to mean and include any glue, cement, or other adhesive containing one or more of the following chemical compounds: acetone, an acetate, benzene, toluene, xylene, butyl alcohol, ethyl alcohol, ethylene dichloride, isopropyl alcohol, methyl alcohol, methyl ethyl ketone, pentachlorophenol, or petroleum ether.

G.S. 90-113.2 provides that "It shall be unlawful: to deliver any barbiturate or stimulant drugs unless such barbiturate or stimulant drug is delivered by a pharmacist in good faith upon prescription; for any person to obtain or attempt to obtain a barbiturate or stimulant drug or any other drug whatsoever that is under the control of the North Carolina pharmacy laws by fraud, deceit, misrepresentation, or subterfuge, or by the forgery or alteration of a prescription, or by the use of a false name or the giving of a false address; for any person to sell or to possess for the purpose of sale, barter, exchange, dispensing, supplying, giving away, or furnishing any barbiturate or stimulant drugs; and, provided, the possession of one hundred or more tablets, capsules or other dosage forms containing either barbiturate or stimulant drugs, or a combination of both, shall be prima-facie evidence that such possession is for the purpose of sale, barter, exchange, dispensing, supplying, giving away, or furnishing; for any person to possess a hypodermic syringe or needle, or any instrument or implement adapted for the use of barbiturate or stimulant drugs by subcutaneous, intramuscular, or intravenous injections, and which is possessed for the purpose of administering barbiturate or stimulant drugs, unless such possession be authorized by the certificate of a physician issued within the period of one year prior thereto." (The term "delivery" means sale, dispensing, giving away, or supplying in any other manner.)

G.S. 90-113.8 Penalties for violation. (a) Any person who violates, or who conspires with, aids, abets, or procures another to violate, G.S. 90-113.2 (5) relating to the illegal sale, possession for the purpose of sale, barter, exchange, dispensing, supplying, giving away, or furnishing the barbiturate or stimulant drugs, shall be guilty of a felony and upon conviction thereof shall be punished by imprisonment for not less than six months, nor more than five years. Upon a second or subsequent conviction for a violation of G.S. 90-113.2 (5) the punishment shall be imprisonment for not less than one nor more than ten years. (b) Any person who violates, or conspires with, aids, abets, or procures another to violate, any provision of this article, other than G.S. 90-113.2 (5), shall be guilty of a misdemeanor and upon conviction shall be punished by a fine of not more than one thousand dollars (\$1,000.00), or by imprisonment for not more than two years, or both, in the discretion of the court. Upon a second or subsequent conviction for a violation of any provision of this article, other than G.S. 90-113.2 (5), the defendant shall be guilty of a felony and shall be fined or imprisoned, or both, in the discretion of the court. (c) For the purpose of ascertaining whether a conviction is a second or subsequent conviction within the meaning of this section, a conviction for the violation of any law of the United States, or any other state, which violation would have been punishable under this article if the offending act had been committed in this State, shall be deemed to be a prior conviction.

Federal Statutes Pertaining to the Possession and Use of Certain Drugs

Marijuana is regulated by the Treasury Department and hallucinogenic drugs by the Bureau of Drug Abuse Control [Pure Food, Drug and Cosmetic Act] of the Department of Health, Education and Welfare. Different statutes apply to each.

1. Marijuana.

Title 26, Section 4741 imposes a tax on all transfers of marijuana of \$1.00 per ounce or fraction thereof upon those who have paid a special license tax and who have complied with regulations. A tax of \$100.00 per ounce or fraction thereof is imposed upon those who have not paid the special license tax and/or have not complied with the regulations.

Title 26, Section 4742(a)—It shall be unlawful for any person, whether or not required to pay a special tax and register under section 4751 to 4753 inclusive, to transfer marijuana, except in pursuance of a written order of the person to whom such marijuana is transferred, on a form to be issued by the Secretary or his delegate. [Except by one engaged in professional practice, by prescription, or by an officer of the U.S.]

Title 26, Section 4744 makes it unlawful for a person [without license and tax] to acquire or obtain marijuana and to be unable, after reason-

able notice, to produce the order form for this marijuana required by Section 4742. Proof that a person has had possession of marijuana is presumptive evidence of guilt.

Title 26, Section 7237 (1966) fixes the following penalties for violation of Section 4742(a) and 4744:

<i>Under Section 4744</i>	<i>Fine</i>		<i>Imprisonment</i>
1st Conviction	Not more than \$20,000.00	and/or	Not less than 2 or more than 10 yrs.
2nd Conviction	Not more than \$20,000.00	and/or	Not less than 5 or more than 20 yrs.
3rd Conviction	Not more than \$20,000.00	and/or	Not less than 10 or more than 40 yrs.
<i>Under Section 4742</i>			
1st Conviction	Not more than \$20,000.00	and/or	Not less than 5 or more than 20 yrs.
Other Convictions	Not more than \$20,000.00	and/or	Not less than 10 or more than 40 yrs.

If the offender has reached his 18th birthday at time of the offense of selling, bartering, or giving away an [illicit] drug or marijuana to one not 18, or conspiring to do so, the imprisonment is not less than 10 or more than 40 years and/or a fine of not more than \$20,000.00.

2. Hallucinogenic Drugs.

Title 21, Section 321(V), (1966)—The term “depressant or stimulant drug” means . . . any substance which the Secretary [Health, Education and Welfare], after investigation, has found to have, and by regulation designated as having, a potential for abuse because of its depressant and stimulant effect on the central nervous system or its hallucinogenic effect except the Secretary shall not designate under this paragraph . . . marijuana as defined in Section 4761. [This section defines marijuana as marijuana and practically all of its components, from seed to dried leaf.]

Title 21, Section 360(a), 7(c), (1966)—No person, other than an exempt person [see next paragraph] shall possess any depressant or stimulant drug otherwise than for personal use or for a member of his household or for his animal.

[An exempt person, referred to in this section, is one in the legal business of selling, treating with, or transporting these drugs. Also, one who is using the drug in research, teaching, or chemical analysis and not for sale.]

Title 21, Section 360(a), 7., (1966)—No person, unless licensed or authorized and acting in the ordinary and authorized course of his business, profession, occupation or employment . . . shall sell, deliver, or otherwise dispose of any depressant or stimulant drug to any other person.

Title 21, Section 333 (1966) fixes the following penalties:

	<i>Fine</i>		<i>Imprisonment</i>
1st Conviction	Not more than \$1,000.00	and/or	Not more than 1 yr.
2nd Conviction	Not more than \$10,000.00	and/or	Not more than 3 yrs.

Any person who has attained his 18th birthday when the offense was committed who sells or disposes of depressant or stimulant drugs to one who has not attained his 21st birthday is subject to these penalties:

	<i>Fine</i>		<i>Imprisonment</i>
1st Conviction	Not more than \$5,000.00	and/or	Not more than 2 yrs.
2nd Conviction	Not more than \$15,000.00	and/or	Not more than 6 yrs.

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FALL, 1969
GOVERNMENT, ADMINISTRATION AND INSTRUCTION

The University Trustees		36
Trustees Emeriti		14
General Administration		18
Faculty and Administrators Emeriti		90
*Instructional Staff		1140
Professors	339	
Associate Professors	256	
Assistant Professors	270	
Associates	80	
Adjunct Faculty	26	
Lecturers	9	
Instructors	42	
Part time Instructors and Graduate Tutors	85	
Visiting Professors and Lecturers	33	
Research Associates		96
Clinical Faculty, Medical School		68
†Educational Administration		23
‡Business Administration		38
§Institutional Advancement		38
*Regional Programs		1
††Student Affairs		21
‡‡Other Officers and Staff		83
Art	3	
Athletics	19	
Audio Visual Education-Medical Center	6	
Duke University Press	6	
Food Services	21	
House Counselors, Woman's College	13	
Music	4	
University Stores	11	
§§The University Libraries		<u>147</u>
Total		1813

- *Includes 9 officers listed with General Administration
†Does not include 7 listed with General Administration,
30 with academic rank listed with Instructional Staff
and 1 listed with Faculty Emeriti
‡Does not include 4 listed with General Administration
§Does not include 1 listed with General Administration
*Does not include 1 listed with General Administration
†Does not include 6 with academic rank listed with
Instructional Staff
‡Does not include 14 with academic rank listed with
Instructional Staff
§Does not include 5 with academic rank listed with
Instructional Staff







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Duke University Libraries